United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine

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Grasshopper and Mormon Cricket Suppression Program for Southern Idaho

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine
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Cover Photo: Mormon cricket migration meets Highway 95 traffic causing slick road conditions in Owyhee County in 2006.

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I. Need for Proposed Action

A. Purpose and Need Statement

The proposed action is to suppress grasshopper and Mormon cricket outbreaks on federally managed rangeland in Idaho. Populations of grasshoppers and Mormon crickets occur in some areas nearly every year in Idaho. The Animal and Plant Health Inspection Service (APHIS) regularly evaluates the population levels and locations of outbreak infestations. This evaluation helps to determine if site-specific action is necessary to suppress outbreaks, to protect rangeland ecosystems, or to counter the potential for grasshoppers and Mormon crickets to spread across rangelands or into surrounding crops and communities.

APHIS is proposing a program to suppress outbreak populations and is consulting with land management agencies and others in the design and implementation of the program. Specifically, APHIS is consulting with Bureau of Land Management (BLM), U.S. Forest Service (FS), and the Idaho State Department of Agriculture (ISDA). This Environmental Assessment (EA) analyzes potential environmental consequences of the proposed action and its alternatives. This EA applies to a proposed suppression program that would take place from April 1, 2015 through September 30, 2015 in Idaho.

Populations of grasshoppers and Mormon crickets that trigger the need for a suppression program are considered on a case-by-case basis. There is no specific grasshopper or Mormon cricket population level that triggers APHIS participation. The density of eight (8) grasshoppers per square yard, or three (3) Mormon crickets per square yard is used as the minimum population for which a suppression program may be considered. However, in many cases, populations of much greater than eight grasshoppers per square yard or three Mormon crickets per square yard may not justify a suppression program. In response to requests from land owners and public land managers, APHIS would determine if an outbreak has reached an economically or environmentally critical level. If so determined, an appropriate treatment plan would be developed, taking into account additional site specific information.

Participation in a Grasshopper or Mormon cricket suppression program is based on potential damage to crops, damage to rangeland, damage to re-vegetation projects, creation of public nuisances, and endangerment of road traffic. Benefits of treatments include protection of forage and crops, increased probability of success for rangeland re-vegetation projects, elimination of public nuisances, and prevention of hazards to road traffic. Some populations may not cause substantial damage to native rangeland, yet may require suppression to prevent damage to high economic value crops on adjacent private land. The goal of the proposed suppression program analyzed in this EA would be to reduce Grasshopper and Mormon cricket outbreak population levels in order to protect rangeland ecosystems and/or private cropland adjacent to rangeland.

This EA is prepared in accordance with the requirements under the National Environmental Policy Act of 1969 (NEPA) (42 United States Code (U.S.C.) § 4321 *et. seq*.) and the NEPA procedural requirements promulgated by the Council on Environmental Quality, United States Department of Agriculture (USDA), and APHIS. A decision will be made by APHIS based on the analysis presented in this EA, the results of public involvement, and consultation with other agencies and individuals. Four (4) alternatives are analyzed. A selection of one of the four alternatives will be made by APHIS for the 2015 Control Program for Southern Idaho.

B. Background Discussion

In rangeland ecosystems of the western United States, grasshoppers and Mormon crickets are a normal component of the biota. Grasshoppers and Mormon crickets forage on grasses, forbs, and shrubs. They recycle nutrients and occupy a valuable position in the food chain. They are native to western rangelands and have evolved to occupy an important niche in the ecosystem. Even though the ecosystem has been impacted by various forms of human intervention and invasion by foreign plant and animal species, grasshoppers and Mormon crickets, in spite of their voracious appetites, are usually benign with respect to human values. It is only when populations reach outbreak levels and threaten valuable resources that control measures are required. Although millions of acres of rangeland are infested by grasshoppers and/or Mormon crickets every year, only a small portion of the area would normally be justified for a suppression program due to outbreak population levels.

APHIS conducts surveys for grasshopper and Mormon cricket populations on rangeland in the western United States, provides technical assistance on grasshopper/Mormon cricket management to land owners/managers, and may cooperatively suppress outbreaks when direct intervention is requested by a Federal land management agency or a State agriculture department (on behalf of a State or local government, a private group or individual). APHIS' enabling legislation provides, in relevant part, that on request of the administering agency or the agriculture department of an affected State, the Secretary, to protect rangeland, shall immediately treat Federal, State, or private lands that are infested with grasshoppers or Mormon crickets (7 U.S.C. § 7717(c)(1)). APHIS' authority for cooperation in this suppression program is based on Section 417 of the Plant Protection Act of 2000 (7 U.S.C. § 7717).

The need for rapid and effective response when an outbreak occurs limits the options available to APHIS. The application of an insecticide within all or part of the outbreak area is the only response available to APHIS to rapidly suppress or reduce (but not eradicate) grasshopper and Mormon cricket populations and effectively protect rangeland.

In June 2002, APHIS completed an Environmental Impact Statement (EIS) document concerning suppression of grasshopper and Mormon cricket populations in seventeen (17) western states (United States Department Of Agriculture Animal and Plant Health Inspection Service, 2002). The EIS described the actions available to APHIS to reduce the destruction caused by grasshopper and Mormon cricket populations in these seventeen states: Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming.

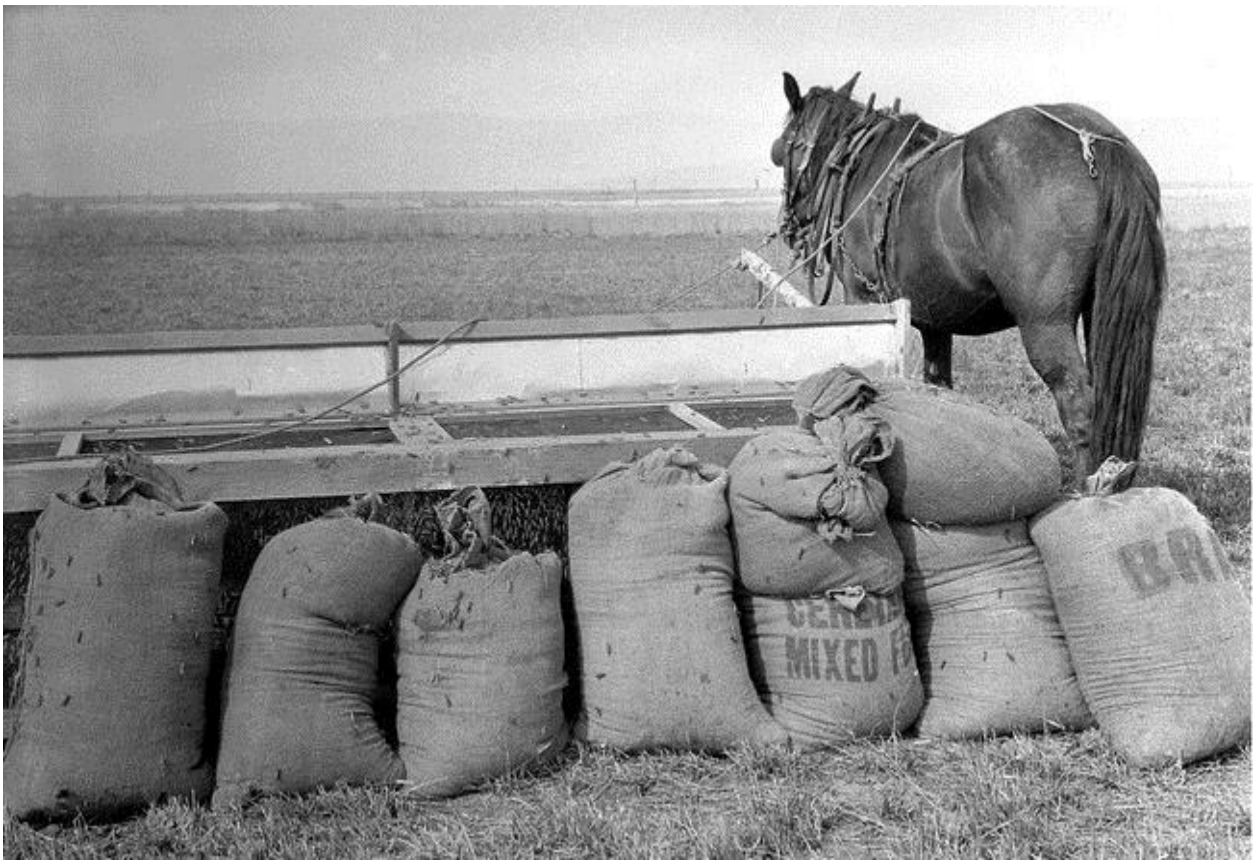
In Southern Idaho in 2015, APHIS would only conduct suppression programs on federally managed rangelands at the request of the federal land manager. APHIS would not conduct suppression programs on state or private lands. APHIS is authorized to treat state and private lands on request of Idaho State Department of Agriculture (ISDA), but the constraints under which APHIS conducts treatments has resulted in determinations by ISDA that no such request will be made.

In recent years APHIS treatments for Mormon crickets and grasshoppers in Idaho totaled:

Acres Treated		
Year	**Mormon crickets**	**Grasshoppers**
2014	85	0
2013	0	0
2012	0	0
2011	50	0
2010	9,790	37,593
2009	17,235	6,945
2008	1,700	3,570
2007	7,405	0
2006	34,720	0
2005	68,520	2,394
2004	18,945	2,520
2003	13,585	11,705

Although utilization of chemical insecticides is the only option available to APHIS for suppression programs, land managers may be able to utilize some Integrated Pest Management (IPM) tools to help hold infestations below severely damaging levels. IPM tools include:

1. Mechanical Control



Horse drawn grasshopper catching machine circa 1917 with catch bagged for use as poultry feed. Photograph: U.S .Department of Agriculture Photo Archive.

Beginning in the 1870s, mechanical grasshopper catching machines and "hopper-dozer" collection devices were used to control grasshoppers. Grasshopper catching machines collected the grasshoppers alive, and the bagging operation could be a challenge for the operator. The "Hopper Dozer" utilized a low pan with an inch of crude petroleum or water and kerosene in it to kill the collected grasshoppers. Most machines required two horses to pull them and were limited to the smoother terrain of farmed ground.

These devices would not be compatible with contemporary precepts regarding destruction of rangeland plant life due to their effects on sagebrush and other shrubs.

Today mechanical control is primarily achieved through tillage practices that disturb the grasshopper's egg pods.

2. Chemical Control

Application of sodium arsenite dust to control Mormon crickets in Wyoming circa 1935. Photograph U.S. Department of Agriculture.

During the first half of the 20th Century, control efforts relied mostly on poison baits, primarily to protect crops. Following WWII, chlorinated hydrocarbon insecticides that were quick acting with long residuals became available. By 1962, the threats to non-target organisms posed by these insecticides became known, and their use was discontinued in cooperative grasshopper control programs.

In 1964, the organophosphate insecticide, Malathion Ultra Low Volume (ULV) spray, became the standard grasshopper control chemical. Additional options included Acephate and Sevin 4 oil, a Carbaryl and diesel mixture.

Insecticide choices for today's cooperative program include Malathion, Diflubenzuron and Sevin XLR, a Carbaryl and water mixture. Diflubenzuron or Dimilin is an insect growth regulator that inhibits chitin formation in insects and has become the new standard chemical for grasshopper control.

3. Biological Control

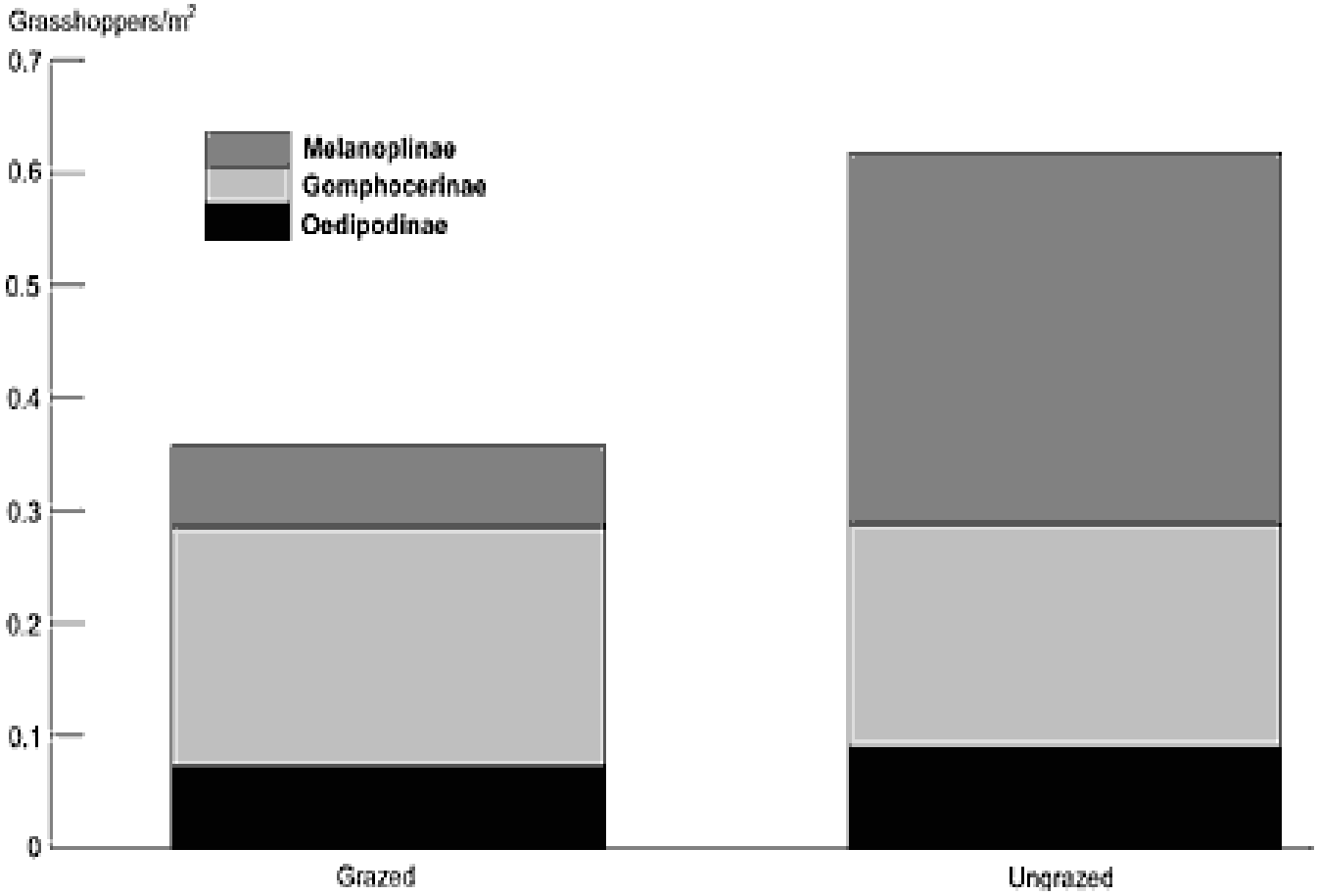
Left: A grasshopper cadaver showing the classic orientation and clasping at or near the top of vegetation that is indicative of Summit disease.
This disease is caused by the fungal pathogen *Entomophaga grylli*, and occasionally can serve to control grasshopper populations. Humidity requirements for the disease have usually limited its effects to localized areas in Idaho.

Conservation of the natural predators, parasites, and pathogens sometimes help hold grasshopper and Mormon cricket populations below outbreak levels. Avoidance of unwarranted insecticide applications is a key measure in such conservation programs. Some birds and mammals are very effective predators of grasshoppers and Mormon crickets. Domestic birds, including turkeys and geese, have been used in some localized areas to reduce grasshopper and Mormon cricket populations.

Classical biological control is based on importing and releasing foreign biological control agents to control exotic invasive species. Classical biological control is not an option here because grasshoppers and Mormon crickets are a native species.

Stakeholders have suggested that the biological insecticide *Nosema locustae* should be utilized in suppression programs in Idaho. Although some testimonials and limited research exist regarding the effectiveness of *Nosema locustae*, it is not likely to provide effective suppression in Idaho. It does exist naturally in the overall population, but loses much of its viability at temperatures over 70 degrees F. (Adams, 94).

4. Cultural Control



Above: Graph depicting effects of grazing on grasshopper populations in Southern Idaho. (Fielding & Brusven, 1996)

USDA's Agricultural Research Service and Land Grant University researchers have accomplished significant research on grazing management and its impacts on grasshopper population density (Onsager, 2000) (Manske, 1996). However, this research is primarily applicable to grasshoppers in short grass prairie ecosystems, not to grasshoppers in the rangelands of the Great Basin. Fielding and Brusven (Fielding & Brusven, 1996) concluded that grasshopper population densities in Idaho could be decreased in the short term by increasing stocking rates of cattle two to three-fold versus the normal stocking rate. However, they also concluded that this practice would have negative long term effects, including the promotion of high densities of pest grasshopper species.

In commentary on the EIS, another federal agency suggested burning and flooding rangeland to manage grasshoppers and Mormon crickets. Private landowners have also suggested burning rangeland to eliminate grasshoppers and Mormon crickets.

APHIS GRASSHOPPER SUPPRESSION PROGRAM

Grasshopper and Mormon cricket populations can build up to outbreak levels despite even the best land management and other efforts to prevent outbreaks. At such a time, a rapid and effective response may be needed to reduce the destruction of rangeland vegetation and protect crops. Unfortunately, there is currently no reliable way to accurately predict the locations and severity with which outbreaks will occur.

APHIS conducts annual surveys for grasshopper and Mormon cricket populations on rangeland in Idaho. APHIS also provides ongoing technical assistance on grasshopper and Mormon cricket management to land owners and managers. APHIS works cooperatively to suppress grasshopper outbreaks on Federal land when direct intervention is requested by the Federal land management agency, and when APHIS determines that intervention is appropriate.

In April 2014, APHIS and the Forest Service (FS) signed a Memorandum of Understanding (MOU) detailing cooperative efforts between the two agencies for suppression of grasshoppers and Mormon crickets on national forest system lands (Document #14-8100-0573-MU). This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress economically damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the FS. The MOU further states that the responsible FS official will request in writing the inclusion of appropriate lands in the APHIS grasshopper suppression project when treatment on national forest land is necessary. The FS must also approve a Pesticide Use Proposal for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document and FS approves the Pesticide Use Proposal.

In February 2009, APHIS and BLM signed a MOU detailing cooperative efforts between the two agencies on suppression of grasshoppers and Mormon crickets on BLM managed lands (APHIS PPQ MOU # 09-8100-0870-MU). This MOU clarifies that APHIS will prepare and issue to the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress economically damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BLM. The MOU further states that the responsible BLM official will request in writing the inclusion of appropriate lands in the APHIS grasshopper suppression project when treatment is necessary. The BLM must also approve a Pesticide Use Proposal for APHIS to treat infestations. According to the provisions of the MOU, APHIS can begin treatments after APHIS issues an appropriate decision document, and BLM approves the Pesticide Use Proposal.

In June 2010, APHIS and the Bureau of Indian Affairs (BIA) signed a Memorandum of Understanding (MOU) detailing cooperative efforts between the two agencies for suppression of grasshoppers and Mormon crickets on lands administered by the BIA (Document # 10-8100-0941-MU). This MOU clarifies that APHIS will prepare and issue to

the public site-specific environmental documents that evaluate potential impacts associated with proposed measures to suppress economically damaging grasshopper and Mormon cricket populations. The MOU also states that these documents will be prepared under the APHIS NEPA implementing procedures with cooperation and input from the BIA. The MOU further states that the responsible BIA official will request in writing the inclusion of appropriate lands in the APHIS grasshopper suppression project when treatment is necessary. The BIA must also approve a Pesticide Use Proposal for APHIS to treat infestations.

APHIS and ISDA cooperate under MOU 08-8100-0403-MU to protect agricultural, horticultural, timber, and natural plant resources from losses caused by plant pests. This cooperation is conducted by APHIS by virtue of authority included in the act establishing the United States Department of Agriculture and the Plant Protection Act of June 20, 2000, (7 USC 7701-7772), which defines plant pests and provides the Secretary of Agriculture authority to cooperate with States or political subdivisions thereof, farmers' associations and similar organizations, and individuals to eradicate, suppress, control, or to prevent or retard the spread of the plant pests. ISDA manages rangeland grasshopper suppression programs on state and private lands, and APHIS manages rangeland grasshopper suppression programs on federally managed lands.

C. Scoping and Input from the Public

In November, 2014, APHIS began seeking public input and comment on the development of an Environmental Assessment (EA) for grasshopper and Mormon cricket suppression in Southern Idaho. Background documentation was posted to the ISDA public website to help commenters understand the proposed action.

Three alternatives proposed for comment were as follows:

Alternative 1 – No Action
APHIS would not conduct insecticide treatments or any other grasshopper/Mormon cricket suppression measures.

Alternative 2 – Crop Protection Program
Upon evaluation of the population density and environmental conditions, APHIS might conduct insecticide treatments with Carbaryl bait, Diflubenzuron spray, or Malathion spray to suppress grasshopper/Mormon cricket outbreaks. Grasshopper treatments would be limited to within one (1) mile of agricultural cropland. Mormon cricket treatments would not be limited to within one (1) mile of agricultural cropland.

Alternative 3 – Rangeland Grasshopper/Mormon cricket Program
Upon evaluation of the population density and environmental conditions, APHIS might conduct insecticide treatments with Carbaryl bait, Diflubenzuron spray, or Malathion spray to suppress grasshopper/Mormon cricket outbreaks. Grasshopper or Mormon cricket treatments would not be limited to within one (1) mile of agricultural cropland.

Summaries of Responses
No comments were received, nor were additional issues raised.

D. About This Process

The EA process for grasshopper/Mormon cricket management is complicated by the fact that there is very little time between requests for treatment and the need for APHIS to take action to respond to those requests. Surveys help to determine areas where grasshopper/Mormon cricket infestations may occur in the spring of the following year. There is considerable uncertainty however in the forecasts, so that framing specific proposals for analysis under NEPA is not possible. At the same time, the program strives to alert the public in a timely manner to its more concrete treatment plans and avoid or minimize harm to the environment in implementing those plans.

This EA will analyze aspects of environmental quality that could be affected by grasshopper/Mormon cricket treatment in the proposed suppression area. This EA will be made available to the public with a 30-day comment period. Following the comment period, any necessary changes will be made, and a Finding of No Significant Impact (FONSI) may be issued, if appropriate.

When the program receives a treatment request and determines that treatment is necessary, the specific treatment site within the proposed suppression area would be extensively examined to determine if environmental issues exist that were not covered in this EA. If no changes to the EA, FONSI, or APHIS Guidelines for Treatment of Rangelands for Grasshopper and Mormon crickets (Appendix 1) are warranted, and an addendum to the EA would be prepared stating this fact. If changes need to be made to the EA, FONSI, or treatment guidelines, the program would prepare a supplement to the EA describing the changes and/or additional site-specific issues that were not covered in the EA. Whether an addendum or supplement is prepared, these documents would be provided to all parties upon request. Addenda and supplements would be prepared between the time that a treatment is deemed necessary and the time that treatment is applied. Addenda and supplements would be prepared in consultation with the federal land manager.

II. Alternatives

The alternatives presented in the 2002 EIS and/or considered for the proposed action in this EA are: (1) no action; (2) insecticide applications at conventional rates and complete area coverage; (3) reduced agent area treatments (RAATs); and (4) modified reduced agent area treatments (MRAATs). Each of the first three alternatives, their control methods, and their potential impacts were described and analyzed in detail in the 2002 EIS. Copies of the complete 2002 EIS document are available for review at 9118 West Blackeagle Drive, Boise, Idaho. It is also available at the Rangeland Grasshopper and Mormon cricket Program web site: http://www.aphis.usda.gov/plant_health/ea/grasshopper_cricket.shtml

The 2002 EIS is intended to explore and explain potential environmental effects associated with rangeland grasshopper suppression programs that could occur in seventeen (17) western states (Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming). The 2002 EIS outlines the importance of grasshoppers and Mormon crickets as a natural part of the rangeland ecosystem.

However, grasshopper/Mormon cricket outbreaks can compete with livestock for rangeland forage and cause devastating damage to crops and rangeland ecosystems. Rather than opting for a specific proposed action from the alternatives presented, the 2002 EIS analyzes, in detail, the environmental impacts associated with each programmatic action alternative related to grasshopper suppression based on new information and technologies.

All insecticides used by APHIS for grasshopper/Mormon cricket suppression are used in accordance with applicable product label instructions and restrictions. Representative product specimen labels can be accessed at the Crop Data Management Systems, Inc. web site at:
http://www.cdms.net/LabelsMsds/LMDefault.aspx?t=. Labels for actual products used in suppression programs will vary depending on supply issues. All insecticide treatments conducted by APHIS will be implemented in accordance with APHIS' treatment guidelines, included as Appendix 1 to this EA.

A. Alternative 1: No Action

Alternative 1: APHIS would not fund or participate in any program to suppress grasshopper/Mormon cricket infestations. Under this alternative, APHIS may opt to provide survey information and limited technical assistance, but any suppression program would be implemented by a Federal land management agency, a State agriculture department, a local government, or a private group or individual.

B. Alternative 2: Insecticide Applications at Conventional Rates and Complete Area Coverage

Alternative 2: Insecticide application at conventional rates and complete area coverage is generally the approach that APHIS used for many years. Under this alternative, Carbaryl, Diflubenzuron (Dimilin®), or Malathion would be employed. Carbaryl and Malathion are

insecticides that have traditionally been used by APHIS. The insect growth regulator Diflubenzuron is also included in this alternative. Applications would cover all treatable sites within the designated treatment block per label directions. The application rates under this alternative are as follows:

- 16.0 fluid ounces (0.50 pound active ingredient (lb a.i.)) of Carbaryl spray per acre;
- 10.0 pounds (0.50 lb a.i.) of 5 percent Carbaryl bait per acre;
- 1.0 fluid ounce (0.016 lb a.i.) of Diflubenzuron per acre; or
- 8.0 fluid ounces (0.62 lb a.i.) of Malathion per acre.

In accordance with EPA regulations, these insecticides may be applied at lower rates than those listed above. Additionally, coverage may be reduced to less than the full area coverage, resulting in lesser effects to non-target organisms.

The potential generalized environmental effects of the application of Carbaryl, Diflubenzuron, and Malathion, under this alternative, are discussed in detail in the 2002 EIS (Environmental Consequences of Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative, pg. 38–48). A description of anticipated site-specific impacts from this alternative may be found in Part V of this document.

C. Alternative 3: Reduced Agent Area Treatments (RAATs)

Alternative 3: RAATs is a recently developed grasshopper/Mormon cricket suppression method in which the rate of insecticide is reduced from conventional levels and treated swaths are alternated with swaths that are not directly treated. The RAATs strategy relies on the effects of an insecticide to suppress grasshoppers/Mormon crickets within treated swaths while conserving grasshopper/Mormon cricket predators and parasites in swaths not directly treated. Carbaryl, Diflubenzuron or Malathion would be considered under this alternative at the following application rates:

- 8.0 fluid ounces (0.25 lb a.i.) of Carbaryl spray per acre;
- 10.0 pounds (0.20 lb a.i.) of 2 percent Carbaryl bait per acre;
- 0.75 fluid ounce (0.012 lb a.i.) of Diflubenzuron per acre; or
- 4.0 fluid ounces (0.31 lb a.i.) of Malathion per acre.

The area not directly treated (the untreated swath) under the RAATs approach is not standardized. In the past two years, the area that remains untreated within a treatment block has ranged from 25% to >99% percent in Idaho. The 2002 EIS analyzed the reduced pesticide application rates associated with the RAATs approach, but assumed pesticide coverage on 100 percent of the area as a worst-case assumption. The reason for this is there is no way to predict how much area will actually be left untreated as a result of the specific action requiring this EA. This Alternative would treat up to 50% of the land surface within a treatment block. Rather than suppress grasshopper/Mormon cricket populations to the greatest extent possible, the goal of this alternative is to suppress populations to a level that preserves a balance of resources.

The potential environmental effects of application of Carbaryl, Diflubenzuron, and Malathion under this alternative are discussed in detail in the 2002 EIS (Environmental Consequences of Reduced Agent Area Treatments (RAATs), pg. 49–57). A description of anticipated site-specific impacts from this proposed treatment may be found in Part V of this document.

D. Alternative 4: Modified Reduced Agent Area Treatments (MRAATs) - Preferred Alternative

Alternative 4: MRAATs combines the RAATs approach explained in Alternative 3 with the 5% rate of Carbaryl bait explained in Alternative 2 and eliminates the Carbaryl spray component included in Alternatives 2 and 3. Treatments would be restricted to federally managed rangelands within one mile of private agricultural land.

Either Carbaryl bait or Diflubenzuron spray or Malathion spray would be considered under this alternative at the following application rates:

- 10.0 pounds (0.50 lb a.i.) of 5 percent Carbaryl bait per acre, or
- 10.0 pounds (0.20 lb a.i.) of 2 percent Carbaryl bait per acre, or
- 0.75 fluid ounce (0.012 lb a.i.) of Diflubenzuron per acre, or
- 6.0 fluid ounces (0.465 lb a.i.) of Malathion per acre.

Although 0.20 lb a.i./acre of Carbaryl bait may be sufficient for suppression of some species of grasshoppers in some situations, heavy grasshopper populations encountered immediately adjacent to crops may require the 0.50 lb a.i./acre rate for adequate and timely suppression.

Aerial applications of bait or spray would be made to no more than 75% of the land area within any specific treatment block (treat three swaths and skip one swath). Thus, the assessments of potential environmental impacts discussed in the 2002 EIS (5% Carbaryl bait, pg. 39-42; 1.0 oz. Diflubenzuron, pg. 42-45; and 8.0 oz. Malathion, pg. 46-48) are based on treatment rates 1.3 to 1.7 times higher than the rates proposed here. Additionally, the assessments discussed in the 2002 EIS for 2% Carbaryl bait (pg. 50-52) and 0.75 fluid ounce Diflubenzuron (pg. 50-57) are based on treatment rates 1.3 times higher than those that would actually be applied under this alternative. The Malathion rate proposed here is intermediate between the two rates discussed in the 2002 EIS and would be applied at up to 75% of the coverage analyzed in the 2002 EIS.

Ground applications of bait would be made to no more than 75% of the land area within any specific treatment block, and may be made to as little as <1% of the land area within any specific treatment block. Ground applications would normally be made to existing roadsides and trailsides, but might be made on off roads or trails with the concurrence of land managers.

III. Methodologies

These methodologies would apply to Alternatives 2, 3, and 4.

A. Land Administration

As provided by the Plant Protection Act, APHIS would conduct rangeland grasshopper and Mormon cricket suppression programs on federal lands in response to requests of the administering agency. Over the past two decades, most of the suppression programs conducted by APHIS in Idaho have been on lands administered by BLM. Smaller amounts of National Forest Service lands have been treated in some years. Although APHIS is authorized to treat state and private rangeland under the Plant Protection Act, the restrictions under which USDA must operate have deterred state and private land managers from seeking cooperative programs in Idaho.

1. Bureau of Land Management

APHIS would treat grasshopper/Mormon cricket outbreaks on public lands administered by the BLM in Idaho when treatments are necessary and can be effective in minimizing private and public resource impacts. APHIS would evaluate site specific complaints and develop proposed treatment strategies consistent with the program and protection measures documented in this EA, and implement specific control or suppression actions.

The rangeland grasshopper suppression program for BLM-managed public lands in Southern Idaho would be implemented primarily for crop protection where private lands are within close proximity to BLM-managed rangeland, and where economic damage is occurring or is expected to occur. All treatments would be designed to minimize the size of treated areas and would incorporate appropriate measures to protect resource values while maintaining treatment effectiveness. These suppression measures might be conducted either by ground or aerial applications.

2. Forest Service

APHIS would treat grasshopper/Mormon cricket outbreaks on National Forest Service lands in Idaho when treatments are necessary and can be effective in minimizing private and public resource impacts. APHIS would evaluate site specific complaints and develop proposed treatment strategies consistent with the program and protection measures documented in this EA, and implement specific control or suppression actions.

The rangeland grasshopper and Mormon cricket suppression program for National Forest Service lands in Southern Idaho would be implemented primarily for crop protection where private lands are within close proximity to National Forest Service lands, and where economic damage is occurring or is expected to occur. All treatments would be designed to minimize treated areas and would incorporate appropriate measures to protect resource values while maintaining treatment effectiveness. These suppression measures might be conducted either by ground or aerial applications.

B. Documenting Rangeland Grasshopper Suppression Programs

APHIS would document complaints from public land managers, private landowners, and other persons with the protocol included in Appendix 3. APHIS would document evaluations, recommendations regarding treatments, and the conduct of treatments with the protocol included in Appendix 3. When APHIS would make a recommendation for a specific treatment block, it would be incumbent on the land manger to determine if the recommendation should be modified to:

- Exclude any sensitive areas that APHIS had included in the proposed treatment block;
- Include additional critical areas that APHIS had not specified; or
- Modify the percentage of the treatment block which receives direct treatment.

The land manager would certify that the proposed treatment, including any modifications, was consistent with the provisions of the EA.

C. Treatment Strategy

The treatment block would consist of a parcel of rangeland infested by a grasshopper/Mormon cricket outbreak. The entire treatment block would not be treated. The surface area to which insecticides would be applied within a treatment block would range from 1% to 75% of the total block. No contiguous strip greater than 300 feet wide would ever be treated.

1. Basis for Decision to Treat

Grasshopper/Mormon cricket populations which are not likely to threaten crops or other resources would not be treated. Several factors are included in the threat assessments. The first level of assessment is the overall population density. This is determined through field survey and is expressed in grasshoppers/Mormon crickets per square yard

Although several dozen species of grasshoppers occur in Idaho, only a few are likely to cause significant damage to crops and rangeland resources. They include the long-horned Mormon cricket, *Anabrus simplex*, as well as Short-horned grasshoppers such as *Camnula pellucida*, *Aulocara elliotti*, *Melanoplus sanguinipes*, *Melanoplus bivittatus*, *Melanoplus packardii*, and *Oedaleonotus enigma*.

2. Selection of Treatment

Following a decision to conduct a treatment, the pesticide would be chosen according to site-specific conditions. This involves many factors, including type and density of vegetation, species' acceptance of bait, terrain, climatic conditions, proximity to pollinators, life stage, importance of rapid reduction of density, need for residual control, costs, and logistics.

The decision of which insecticide (if any) to use in any situation depends on a variety of factors specific to any given site and situation. Each of the insecticides which might be selected for a treatment has characteristics that dictate its desirability for a treatment.

a) Diflubenzuron

Diflubenzuron only kills grasshoppers, Mormon crickets or other insects when they are in their immature stages. It will not kill adult grasshoppers or Mormon crickets. It cannot be used late in the season because fully mature grasshoppers/Mormon crickets are no longer susceptible. In a normal year, the opportunity to use Diflubenzuron in Idaho can be expected to be over by about July 15th for Mormon crickets and most species of grasshoppers. Insects are not killed until seven to ten days after treatment. Diflubenzuron is reported to have a residual activity against grasshoppers and Mormon crickets, lasting up to 28 days.

Because Diflubenzuron is a chitin inhibitor that disrupts insects from forming their exoskeleton, organisms without a chitinous exoskeleton, such as mammals, fish, and plants, are largely unaffected by Diflubenzuron. In addition, adult insects, including wild and cultivated bees, would be mostly unaffected by Diflubenzuron applications (Schroeder, Sutton, & Beavers, 1980) (Emmett & Archer, 1980).

Diflubenzuron is less harmful to other insects and must normally be ingested to be effective. Therefore, Diflubenzuron does not affect adult insects, piercing sucking insects and most non-phytophagous terrestrial insects. Diflubenzuron would be applied as a spray with water and crop or canola oil. It is the least costly option per acre treated. The formulation of Diflubenzuron approved for use by APHIS is Dimilin 2L ®.

b) Carbaryl

Carbaryl bait acts faster than Diflubenzuron. It kills adult and immature grasshoppers and some other insects. It has a broader spectrum of insecticidal activity than Diflubenzuron, but it also must be ingested to be lethal. It can be used effectively any time during the grasshopper or Mormon cricket season, and can be applied by air or ground. It is the most costly treatment option. Carbaryl bait is applied in greater volume than any of the other treatments (up to 10 lbs. dry material per acre) and creates a greater logistical problem because of the amount of material which must be stored, transported and applied.

Carbaryl bait can be applied by air in some situations when and where liquid insecticides cannot. Although no aerial applications of any insecticide can be conducted when wind speeds exceed 10 mph, Carbaryl bait can be applied when air temperatures are too high to permit effective applications of sprays. Additionally, when terrain is too rough to allow flying at the low altitude consistent with effective spray application, bait can be applied at a safe altitude. Thus, the window of opportunity to apply bait is greater than for sprays. The

Carbaryl bait formulations approved for use by APHIS include products which impregnate Carbaryl onto wheat bran, onto rolled whole wheat, and into pellets manufactured from grape and apple pumice or outdated human food products.

c) Malathion

Malathion spray is a broad spectrum contact insecticide that is more effective in hot weather vs. cool weather. It kills adult and immature grasshoppers and Mormon crickets, and many other insects. It has immediate knock-down effect and has essentially no residual activity. It is applied by air for grasshoppers/Mormon crickets on rangeland and is intermediate in cost between Carbaryl bait and Diflubenzuron. It carries higher risk for non-target species vs. Diflubenzuron or Carbaryl bait.

The formulations of Malathion approved for use by APHIS are Ultra Low Volume Concentrates. They are applied without an additional carrier. Malathion would only be selected when grasshopper/Mormon cricket populations were extremely high, immediate reduction of the population was required, and options for successful use of Carbaryl bait or Diflubenzuron spray did not exist.

Because of their different modes of action and suitability under different climatic conditions, the three pesticides can be sorted as follows:

Grasshopper/Mormon Cricket Life Stage	Weather Conditions	Pesticide of Choice
Nymphs	Cool and wet	Diflubenzuron or Carbaryl
Nymphs	Hot and dry	Diflubenzuron, Carbaryl or Malathion
Adults	Cool and wet	Carbaryl
Adults	Hot and dry	Carbaryl or Malathion

Cost of applications, on a per acre basis, would vary with the method of application, insecticide used, size and shape of a treatment block, and distance from a support center. Aerial applications would be less expensive than ground applications. Diflubenzuron spray would be the least expensive and Carbaryl bait would be the most expensive insecticide. Larger, regular blocks would be more economical to treat than smaller, irregularly shaped blocks. Ferry and transportation costs would be greater for blocks further from an airstrip or support base.

3. Multiple Applications

No area would be treated more than once during a grasshopper/Mormon cricket season. No area which was treated for Mormon crickets during the current calendar year would be treated for grasshoppers.

4. Methods of Application

Insecticides would be applied in swaths which have a width determined for each treatment device (aircraft, truck-mounted spreader, or ATV-mounted spreader). For instance, an Ayres Turbine Thrush aircraft can deliver a 100 foot swath, and an ATV-mounted bait spreader may deliver a swath up to 40 feet wide with Carbaryl bait. Swaths delivered by aircraft are parallel to one another, and swaths delivered by ground equipment are dependent on the accessibility of the terrain. Distance between swaths allows computation of the percentage of the treatment block that actually receives direct treatment.

5. Discrimination Based on Vegetation Type

Because of concerns for conservation of insects as food for sage-obligate bird species, APHIS would decrease the amount of coverage on treatment blocks where more than 15% of the area is covered by shrub canopy. Federal land managers would determine if the area included in the block was covered with more than 15% shrub canopy and they would notify APHIS if the land was classified as grassland or shrub steppe. APHIS would apply Malathion to shrub steppe only if grasshopper or Mormon cricket populations exceeded 25 per sq. yard.

Because of their different types of vegetation and suitability under different treatment area conditions, the three pesticides can be sorted as follows:

Proposed Treatments for Idaho Grasshopper and Mormon cricket Suppression

Treatment	Treatment Area Characteristics	Proposed Treatment Blocks
Diflubenzuron Spray *Applied at rate of 0.75 fluid ounce of Diflubenzuron per acre (0.012 lb. a.i. per acre).*	Grasslands	*Up to 1 mile strip of rangeland with up to 75% coverage.*
	Shrub Steppe	*Up to 1 mile strip of rangeland with up to 50% coverage*.
Carbaryl Bait *Applied at rate of 10.0 pounds of 5% or 2% Carbaryl bait per acre (0.50 or 0.20 lb. a.i. per acre).*	Grasslands	*Up to 1 mile strip of rangeland with up to 75% coverage*.
	Shrub steppe	*Up to 1 mile strip of rangeland with up to 50% coverage*.
Malathion Spray *Applied at rate of 6.0 fluid ounces of Malathion per acre (0.465 lbs. a.i. per acre).*	Grasslands	*Up to 1 mile strip of rangeland with up to 75% coverage*.
	Shrub steppe	*Not used unless grasshopper population exceeds 25/sq. yd. Up to 1 mile strip of rangeland with up to 50% coverage*.

6. Protective Measures in Addition to FY 2015 Guidelines (Appendix 1)

Appendix 1 includes protective measures which would be used in all APHIS Rangeland Grasshopper Suppression Programs nationwide. Following are additional measures which would be implemented in Idaho:

- Insecticide application rates would be reduced below EPA maximum allowable rates.

- Treatment blocks would not receive full area coverage. 25% to >99% of each treatment block would not receive direct application of insecticide.

- Aerial applications of Carbaryl bait would not be made within 500 feet of water. APHIS would perform on-site examination of proposed treatment blocks to determine the presence of water.

- Noxious weed biological control agent release sites would be considered on an individual basis in consultation with the land manager to determine if insecticide might be used and/or how much buffer space should be allowed.

- No aerial application would be made within .5 mile of crops enrolled in the Idaho Certified Organic Crop Program, except on the request of the organic farm manager. APHIS may decline to apply any treatments which were requested inside this buffer area. APHIS develops buffers which will assure that unintended consequences of pesticide applications are avoided. In most cases, the buffers are sized to prevent potentially toxic levels of the insecticide from reaching a sensitive site. In the case of organic crops, any detectable residue could have a deleterious impact on the certification of the crop.

- APHIS would make available a mechanism whereby individuals can request that federally managed rangelands around or adjacent to their private property would be excluded from treatments for grasshoppers. The request form is available at:

  http://www.agri.state.id.us/Categories/PlantsInsects/GrasshopperMormonCricketControlProgram/Documents/FormsPublicationsReports/no%20spray%20request%202008%20.pdf

It is also available at many County Extension Offices, BLM Offices and Forest Service Offices. It is also available from APHIS in Boise. Requests for the form may be sent to USDA APHIS PPQ, 9118 West Blackeagle Drive, Boise ID 83709-1572 or faxed to 208-378-5794.

IV. Affected Environment

A. Description of Affected Environment

It is not generally possible to predict the precise locations where grasshopper/Mormon cricket outbreaks and migrations will occur in any given year. Because APHIS cannot be sure where migration and spread of the infestations will occur, it is necessary to include an expanded area in the EA. The proposed suppression program area specified in this EA includes virtually all areas in Southern Idaho which might host outbreaks that would require suppression.

The proposed grasshopper suppression area is limited to Federal rangelands within one (1) mile of private agricultural lands. We estimate that there are 2,550,537 acres of Federal rangeland in Southern Idaho that fit this criterion, before subtraction of excluded areas such as ACEC's (Areas of Critical Environmental Concern), Snake River Birds of Prey National Conservation Area, and buffered areas for sensitive species.

APHIS estimates that no more than 1 to 2% of this area would be included in treatment blocks and maximum area treated within a block would not exceed 75%.

By individual counties these acreage figures are as follows:

COUNTY	ACRES		COUNTY	ACRES
Ada	49177		Fremont	44812
Adams	13212		Gem	15881
Bannock	55486		Gooding	66920
Bear Lake	31326		Jefferson	78398
Bingham	94708		Jerome	82359
Blaine	121435		Lemhi	24874
Boise	6654		Lincoln	128982
Bonneville	69815		Madison	10255
Butte	122158		Minidoka	29318
Camas	21374		Oneida	84714
Canyon	2887		Owyhee	274286
Caribou	111406		Payette	7721
Cassia	263132		Power	53981
Clark	141490		Teton	21714
Custer	88099		Twin Falls	158960
Elmore	211271		Valley	5464
Franklin	17986		Washington	40282

Map of the described areas are in Appendix 2 – Potential Grasshopper Treatment Areas for Idaho

B. General Description

The area lies within the Interior Columbia Basin. Landforms consist primarily of valleys bordered by north-south running mountain ranges. Numerous impoundments on the Snake River and its tributaries serve multipurpose use. Irrigation systems serve agricultural areas throughout the region. Except for the Snake River (and Bear River in southeast Idaho) and its major tributaries, most streams in the area are generally intermittent. There are some small streams which are perennial. Major tributaries of the Snake River that traverse proposed program areas include:

	Southwest Idaho	**South Central Idaho**	**Southeast Idaho**
Major Tributaries	Boise, Weiser, Bruneau, Owyhee, and Payette Rivers	Big Wood, Little Wood and Bruneau Rivers; Rock, Salmon Falls, and Camas Creeks	Portneuf River and Rock Creek
Predominate Mountain Ranges	Owyhee, Boise, and West Mountains	Albion Mountains and South Hills on southern edge; Soldier, Smoky and Pioneer Mountains form northern edge.	Deep Creek Mountains; Portneuf, Wasatch, and Caribou Ranges

Events during the Pleistocene shaped much of Idaho's landscape. In the southern portions of Idaho, repeated overflows of historic Lake Bonneville into the Snake River modified the Snake River Valley. In addition to volcanic flows, sedimentary deposits including glacial till, outwash and loess, and valley fill, terraces, and scour features are present over much of the area. Soils in the Snake River Plains developed from loess deposits, and this has enabled these areas to become highly productive agricultural areas. Intensive livestock production systems such as dairies, feedlots, and trout farms create demand for feed which is partially supplied locally by alfalfa, corn, and wheat fields. Potatoes, sugar beets, and grain are other primary crops produced within the area.

The most intense agricultural production sites are located in the Treasure Valley and Lower Payette Valley in southwest Idaho; the Magic Valley and Camas Prairie in south central Idaho; the Snake River Plain; and in valleys and on foothills in southeast Idaho. Crops include row crops for food and feed, and very high value seed crops. The 2012 census of agriculture lists total market value of Idaho crops at $3,442,941,000 and livestock sales of $4,342,130,000.

The plains and foothills are semi-arid sagebrush steppe. Average annual temperature is 40 to 55 °F. Total annual precipitation averages 5 to 20 inches; almost no rain falls during the summer months. Examples of probability of 0.50" of precipitation in a 24 hour period April 15 to August 15 (Western Regional Climate center, http://www.wrcc.dri.edu) are:

Probability of 0.50" Precipitation/24 Hr. April 15 to August 15	
Caldwell	0 to 3%
Cambridge	0 to 5%
Gooding	0 to 2%
Hailey	0 to 4%
Idaho Falls	0 to 4%
Malad	0 to 4%
Mountain Home	0 to 2%
Parma	0 to 3%
Pocatello	0 to 3%
Richfield	0 to 2%
Silver City	0 to 9%
Twin Falls	0 to 2%

The rangelands are primarily shrub steppe and are utilized for cattle and sheep grazing. They provide habitat for native and introduced game, and non-game animal species. They are in an accelerated state of ecological change due to invasion by exotic plant species, changes in fire patterns, and intervention by humans.

Grassland and shrub land are present across the general area. Forest lands are present at higher elevations. Grasshopper/Mormon cricket treatments would occur only in grass and shrub lands, not in forests. BLM manages rangelands within the Boise, Twin Falls, and Idaho Falls Districts. FS manages rangelands within Boise and Payette National Forests, Sawtooth, Caribou, Targhee, Cache National Forests, and the Curlew National Grasslands, where treatments might occur.

Elevation and topography within the overall area vary considerably from 2,000 to near 10,000 feet, and from flat plains to steep mountain ranges. Treatments would occur on mountains, foothills, and flatlands, usually near cropland and hayfields. Some treatments could occur on remote blocks of rangeland where critical forage or re-vegetation projects or recreational resources are threatened by grasshoppers.

Towns or cities near the federally managed rangelands include: American Falls, Arco, Boise, Burley, Dubois, Gooding, Hailey, Idaho Falls, Malad, Mountain Home, Murphy, Pocatello, and Twin Falls. Special areas include: Bear Lake, Camas, City of Rocks National Reserve, Craters of the Moon National Monument, Jarbidge-Bruneau Rivers Wilderness, Deer Flat National Wildlife Refuge, Duck Valley Indian Reservation, Fort Hall Indian Reservation, Gray's Lake, Hagerman Fossil Beds National Monument, Hagerman National Fish Hatchery, Minidoka National Wildlife Refuge, Oxford Slough National Wildlife Refuge, and the Snake River Birds of Prey National Conservation Area. Idaho National Laboratory occupies a very large tract of land in southeast Idaho and provides a large employment base.

Excluded Program Areas
Areas specifically excluded from treatment are:

- All Wilderness Areas

- Rangeland areas in the watersheds which drain into the Snake River downstream from Brownlee Dam will be excluded. APHIS has completed consultation with National Oceanic and Atmospheric Administration (NOAA) Fisheries regarding measures to protect endangered salmon and steelhead. However, APHIS would not include watersheds which are involved with those species. Historically there has been less need for treatments in Northern Idaho and fewer situations where a crop protection program could be implemented. For these reasons APHIS has chosen to limit its suppression program to Southern Idaho.

- All Areas of Critical Environmental Concern unless otherwise noted below.

- Wilderness Study Areas (WSA) and Research Natural Areas (RNA) will be excluded from consideration for treatments except for those within the Owyhee Field Office of BLM which will be considered on a case-by-case basis.

- Other areas which are specifically identified in this EA in section V.B.5 because of their association with sensitive species or other sensitive sites will be excluded.

- Snake River Birds of Prey National Conservation Area, south of Boise, including the Ted Trueblood Wildlife Area, north of Grandview in Elmore County.

- Treatment in the Boise Front Area of Critical Environmental Concern (ACEC) would only be considered on a case-by-case basis. Ground treatment would be limited to existing roads and trails.

- The Sugar Valley Badlands proposed Area of Critical Environmental Concern south of Bruneau.

- The Mulford's Milkvetch proposed Area of Critical Environmental Concern near Grand View.

- The Horse Hill proposed Area of Critical Environmental Concern near Bruneau.

- The Mud Flat Oolite Area of Critical Environmental Concern and the proposed expansion to the Mud Flat Oolite ACEC, south of Grand View.

- Treatment in the Long-billed Curlew Habitat ACEC, north and east of Boise would only be considered on a case-by-case basis after July 15. Ground treatment would be limited to existing roads and trails. No application of Malathion would be permitted within the Curlew ACEC.

- Treatment in Columbian Sharp-tailed Grouse ACEC, north of Weiser would only be considered on a case-by-case basis. Ground treatment would be limited to existing roads and trails.

- Jump Creek Canyon ACEC, near Marsing and the Boulder Creek ONA/ACEC, west of Triangle in Owyhee County.

- Aerial Carbaryl bait application would be the only treatment under consideration in the proposed Biological Soil Crusts ACEC.

C. Site-Specific Considerations

1. Human Health

The suppression program would be conducted on federally managed rangelands that are not inhabited by humans. Human habitation may occur on the edges of the rangeland. Most habitation is comprised of farm or ranch houses, but some rangeland areas may have suburban developments nearby. Average population density in rural areas of Idaho is 6.3 persons per square mile. Recreationists may use the rangelands for hiking, camping, bird watching, hunting, falconry or other uses. Ranchers and sheepherders may work on the rangelands on a daily basis.

Individuals with allergic or hypersensitive reactions to insecticides may live near or may utilize rangelands in the proposed suppression program area.

Entomophobic individuals may live near or may utilize rangelands in the proposed suppression area. Entomophilic individuals may live near or utilize rangelands in the proposed suppression area.

Some rural schools may be located in areas near the rangeland which might be included in treatment blocks. Children may visit areas near treatment blocks or may even enter treatment blocks before or after treatments. It has been suggested that children might consume bait formulations of insecticide.

2. Non-target Species

Non-target species within the suppression program area include terrestrial vertebrate and invertebrate animals, aquatic organisms, and terrestrial plants (both native and introduced).

Invertebrate organisms of special interest include bio-control agents and pollinators. Land managers and others have released and managed bio-control agents, including insects and pathogens, on many species of invasive plants within and near the suppression program area. These bio-control agents are important in decreasing the overall population, or the rate of reproduction, of some species of undesirable rangeland plants, especially exotic invasive weeds.

Pollinators, including insects and other organisms, occur within and near the suppression program area. Pollinators include managed exotic and native insect species such as honey bees, leafcutter bees, and alkali bees which are commercially valuable for agriculture. Other species of insects and other animals pollinate native and exotic plants and are necessary for the survival of some species.

Vertebrates include highly visible introduced and native mammalian species such as cattle, sheep, horses, mule deer, elk, pronghorn, coyotes and wolves, as well as smaller animals like rabbits, mice, gophers and bats. Birds comprise a large portion of the vertebrate species complex, and they also include exotic and native species. Some exotic game birds, like pheasant and partridge, have been deliberately introduced into the area, and other species such as starlings and pigeons have spread from other loci of introduction. Sage obligate bird species, typified by sage grouse, are present in much of the area. Various reptiles and amphibians are also present. Many of the herbivorous vertebrate species compete with grasshoppers/Mormon crickets for forage. Many of the vertebrate species utilize grasshoppers/Mormon crickets and other insects as a food source. There is special concern about the role of grasshoppers/Mormon crickets as a food source for sage grouse, sharp-tailed grouse, Yellow-billed Cuckoo and other bird species.

The proposed suppression area contains a vast variety of terrestrial invertebrates, primarily insects and other arthropods. They include species which compete with grasshoppers/Mormon crickets, and some which prey on grasshoppers/Mormon crickets. In turn, grasshoppers/Mormon crickets may prey opportunistically on other invertebrates.

Aquatic organisms within the suppression area include plants and vertebrate and invertebrate animals. Some species of fish utilize grasshoppers/Mormon crickets as a significant food source during some parts of the year.

A diverse complement of terrestrial plants occurs within the proposed suppression area. Many such as rush skeletonweed, purple loosestrife, spotted and diffuse knapweed, cheatgrass and leafy spurge are invasive weeds. Others, such as crested wheatgrass have been planted for rehabilitation purposes. Native plants such as sagebrushes, bitterbrush, and various grasses provide forage and shelter for animal species and help stabilize the soil against erosion.

Biological soil crusts, also known as cryptogrammic, microbiotic, cryptobiotic, and microphytic crusts, occur within the proposed suppression area. Biological soil crusts are formed by living organisms and their by-products, creating a crust of soil particles bound together by organic materials. Crusts are predominantly composed of cyanobacteria (formerly blue-green algae), green and brown algae, mosses, and lichens. Liverworts, fungi and bacteria can also be important components. Crusts contribute to a number of functions in the environment. Because they are concentrated in the top one to four millimeters of soil, they primarily affect processes that occur at the land surface or soil-air interface. These include soil stability and erosion, atmospheric N-fixation, nutrient contributions to plants, soil-plant-water relations, infiltration, seedling germination, and plant growth.

Federally listed threatened and endangered species which might occur in or near the proposed suppression area include:

FEDERAL LISTED T & E SPECIES	IDAHO COUNTIES
Banbury Springs Lanx	Gooding
Bliss Rapids Snail	Elmore, Gooding, Jerome, Twin Falls
Bruneau Hot Springsnail	Owyhee
Bull Trout	Ada, Adams, Blaine, Boise, Butte, Custer, Elmore, Gem, Owyhee, Payette, Valley, Washington
Canada Lynx	Adams, Bear Lake, Blaine, Boise, Bonneville, Butte, Camas, Caribou, Clark, Custer, Elmore, Franklin, Fremont, Jefferson, Madison, Teton, Valley
Yellow Billed Cuckoo	Ada, Bannock, Bingham, Boise, Bonneville, Camas, Cassia, Clark, Custer, Elmore, Fremont, Jefferson, Lincoln, Lemhi, Madison, Minidoka, Owyhee and Power
Grizzly bear	Bonneville, Clark, Fremont, Teton
Northern Idaho Ground Squirrel	Adams, Valley, Washington
Slickspot Peppergrass	Ada, Canyon, Elmore, Gem, Owyhee, Payette
Snake River Physa Snail	Ada, Canyon, Cassia, Elmore, Jerome, Gooding, Minidoka, Owyhee, Twin Falls
Ute Ladies'-Tresses	Bingham, Bonneville, Fremont, Jefferson, Madison

Areas where critical habitat for bull trout is designated may be within or near the proposed suppression area include parts of Ada, Adams, Blaine, Boise, Butte, Camas, Custer, Elmore, Gem, Owyhee, Payette, Valley, and Washington Counties.

Discussion of these species is included in section: V.B.5.

Many other species are accorded special status by federal land managers or by the State of Idaho. Data about these species are available from the respective land managers or at http://www2.state.id.us//fishgame/info/cdc/cdc.htm.

3. Socioeconomic Issues

Local economies in the areas near most proposed suppression areas are driven primarily by agricultural production, processing, and marketing concerns. Major employers in southern Idaho include Super Value, Inc.; Fred Meyer, Inc.; Hewlett-Packard Co.; Idaho Power Co.; J.R. Simplot Co.; Micron Technology, Inc.; Potlatch Corp.; St. Alphonsus Regional Medical Center; St. Luke's Regional Medical Center; and Wal-Mart. These businesses roughly divide into those which have headquarters, factories or service centers located in the Boise metropolitan area, and those which support agricultural and natural resource enterprises or provide retail trade in the rural areas.

Livestock enterprises include rangeland grazing by cattle and sheep, feedlots for beef, and concentrated dairy operations. Local processing which adds value to livestock production systems includes meat packing houses and cheese processing plants.

Farmers in areas near proposed suppression areas grow feed for the dairies and feedlots. This includes alfalfa and corn. They also grow potatoes, sugar beets, wheat, barley, sweet corn, beans, and a variety of other crops. Potato and sugar beet processing plants add value in several of the rural communities. In some areas near the proposed suppression area, growers produce seed of flowers and various forage, feed, and vegetable crops. The seed crops are often of exceptionally high value per acre compared to crops for consumption.

Acreage in organic production has increased in the area near proposed suppression areas. There were over 115,000 acres registered in organic production in Idaho in 2011. This includes feed for organic dairies and various other organic crops.

Beekeepers maintain hives to produce honey and other bee products on land which is included in or located near the proposed treatment area. Seed and fruit crops rely on pollination from bees which may live or forage on or near proposed suppression areas.

The general public uses federally managed rangelands in the proposed suppression area for a variety of recreational purposes including hiking, camping, viewing wildlife, hunting, falconry, shooting, plant collecting, rock collecting, and sightseeing. Members of the general public traverse rangelands in or near the proposed suppression area on foot, horseback and other beasts of burden, all-terrain vehicles, bicycles, motorcycles, four-wheel drive vehicles, snowmobiles, aircraft, and balloons.

Artificial surfaces in or near the proposed suppression area include the walls and roofs of buildings, painted finishes on automobiles, trailers, recreational vehicles, and road signs. See 2002 EIS, pg. 71-72.

Aesthetic values of the natural environment in the suppression area include the views, vistas, diversity of the biota, and the opportunity to commune with nature in isolated settings. Many stakeholders have expressed extremely strong opinions regarding the aesthetics of the natural environment.

4. Cultural Resources and Events

Cultural and historical sites include locations and artifacts associated with Native Americans, explorers, pioneers, religious groups and developers. Native American petroglyphs have been discovered in several areas within the proposed suppression area. Artifacts from knapping occur within the proposed suppression area. Elements of the Oregon and California Trails transect portions of the proposed suppression area, and monuments have been erected in several places. Museums, displays and structures associated with mining, logging, and irrigation development exist in areas near the proposed suppression area.

5. Special Considerations for Certain Populations

a) Executive Order No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Executive Order (E.O.) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, was signed by President Clinton on February 11, 1994 (59 *Federal Register* (FR) 7269). This E.O. requires each Federal agency to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. Consistent with this E.O., APHIS will consider the potential for disproportionately high and adverse human health or environmental effects on minority populations and low-income populations for any of its actions related to rangeland grasshopper/Mormon cricket suppression programs.

Population makeup in Idaho (U.S. Census Bureau 2013) is 93.7 % Caucasian. Hispanic, including Latino of any race, is the next most numerous group, comprising 11.8%. Other identifiable groups include Black or African American 0.8%, American Indian and Alaska Native 1.7 %, Asian 1.4%, and Native Hawaiian and Other Pacific Islander 0.2%. Of the minority groups, Hispanic and Asian appear to be the groups with most involvement in agriculture. Hispanic workers are often engaged in production and processing of crops. Sheepherding is a profession which currently engages persons of Peruvian nationality or descent. Persons of Asian descent are frequently involved in crop production and processing.

Figures for Idaho put 15.5 % of the individuals in the state below the poverty level in 2009-2013. Median household income was estimated at $46,767 in 2009-2013.

b) Executive Order No. 13045, Protection of Children from Environmental Health Risks and Safety Risks

The increased scientific knowledge about the environmental health risks and safety risks associated with hazardous substance exposures to children and recognition of these issues in Congress and Federal agencies brought about legislation and other requirements to protect the health and safety of children. On April 21, 1997, President Clinton signed E.O. 13045, Protection of Children from Environmental Health Risks and Safety Risks (62 FR 19885). This E.O. requires each Federal agency, consistent with its mission, to identify and assess environmental health risks and safety risks that may disproportionately affect children and to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. APHIS has developed agency

guidance for its programs to follow to ensure the protection of children (USDA, APHIS, 1999).

Children under six (6) months of age may have greater susceptibility to Carbaryl than older individuals because they have immature livers and incompletely developed acetyl cholinesterase systems (2002 EIS B-28). It has been suggested that children might pick up and eat Carbaryl bait.

Infants under three (3) months of age have higher levels of methemoglobin than do older children and adults. Therefore, they may be at increased risk of methemoglobinemia if exposed to Diflubenzuron.

The low frequency, with which infants are present on rangelands, the low density of Carbaryl bait in the environment (approximately one pellet per two square feet), the difficulty of finding bait pellets on the ground, and the low application rate of Diflubenzuron, make the likelihood of exposure and toxic consequences negligible.

V. Environmental Consequences

Each alternative described in this EA potentially has adverse environmental effects. The general environmental impacts of each alternative, and of Carbaryl, Diflubenzuron and Malathion, are discussed in detail in the 2002 EIS. The specific impacts of the alternatives are highly dependent upon the particular action and location of infestation. The principal concerns associated with the alternatives are: (1) damage to crops and natural resources caused by grasshopper/Mormon cricket outbreaks; (2) the potential effects of insecticides on human health (including subpopulations that might be at increased risk); and (3) impacts of insecticides on non-target organisms (including threatened and endangered species).

A. Environmental Consequences of the Alternatives

Site-specific environmental consequences of the alternatives are discussed in this section.

1. Alternative 1: No Action

Under this alternative, APHIS would not fund or participate in any program to suppress grasshoppers/Mormon crickets. If APHIS does not participate in any rangeland grasshopper/Mormon cricket suppression program, Federal land management agencies, State agriculture departments, local governments, or private groups or individuals may not effectively combat outbreaks in a coordinated effort. In these situations, outbreaks could develop and spread unimpeded. See 2002 EIS, pg. 29-30 for general consequences.

Human Health

Very dense bands of grasshoppers/Mormon crickets can make roadways slick. It is not known whether any traffic accidents have been directly attributed to this

phenomenon in Idaho. Highway 55 was made slick by migrating *Camnula pellucida* in Valley County in 2000. There is some risk of personal injury or death due to automobile accidents caused by grasshoppers/Mormon crickets on highways and roads.

Persons who are entomophilic may have reduced levels of concern and increased enjoyment from experiencing the outbreaks for recreational or scientific purposes. Persons who are entomophobic may have increased levels of concerns about insect abundance.

Some stakeholders have indicated in past years that they are opposed to any treatments on public rangelands because they believe treatments would disrupt ecosystems, create human health problems or give unfair economic advantage to agricultural interests. The anxiety levels of these stakeholders may be reduced if APHIS does not suppress grasshopper/Mormon cricket outbreaks.

If APHIS does not treat grasshopper/Mormon cricket outbreaks on rangeland, there is an increased probability of additional insecticidal treatments on crops which would be invaded by grasshoppers/Mormon crickets. This would result in increased exposure of farm workers, including members of minority populations, to insecticides with higher toxicity than Carbaryl or Diflubenzuron.

Non-target Species

An abundant supply of grasshoppers, Mormon crickets, and other insects could be available as a food source for insectivorous animals. This includes birds and other animals which have been accorded sensitive species status by land managers and others.

Grasshoppers and Mormon crickets in unsuppressed outbreaks could consume agricultural and nonagricultural plants. The damage caused by these outbreaks could also pose a risk to rare, threatened, or endangered plants that often have a low number of individuals and limited distribution. Plants can be killed or weakened by grasshopper/Mormon cricket feeding. Some grasshoppers and Mormon crickets feed on seeds, so future generations of plants could be threatened.

Loss of plant cover could occur due to consumption by grasshoppers/Mormon crickets. Nesting and cover habitat may be degraded for birds and other wildlife. The herbaceous understory is important to nesting success by sage grouse (Connelly, Reese, Wakkinen, & others, 1994).

Rangeland which has been overgrazed by grasshoppers is more susceptible to invasion by non-native plant species. Plant cover may protect the soil from the drying effects of the sun. The plant root systems which hold the soil in place may be weakened, leading to increased rates of erosion.

Grasshoppers and Mormon crickets are fairly omnivorous creatures. In Idaho, they do not only feed on live plants, but they also commonly feed on cow manure and the

bodies of recently killed animals, including snakes, toads, and birds. These insects are well known to be cannibalistic and also feed on other insects. They may pose a risk to fledgling birds as well. La Rivers (La Rivers, 1944) reported a nest of half-grown Brewers sparrows devoured by a swarm of crickets. Grasshoppers and Mormon crickets feed on fungi (Pfadt, 1994) so may pose a threat to biological soil crusts.

If APHIS does not participate in any rangeland grasshopper/Mormon cricket suppression programs, local governments, private groups or individuals may attempt to conduct widespread grasshopper programs. Without the technical assistance and program coordination that APHIS can provide, it is possible that a large amount of insecticides, including that APHIS considers too environmentally harsh, could be applied, reapplied, and perhaps misapplied in an effort to suppress or even locally eradicate grasshopper and Mormon cricket populations. It is not possible to accurately predict the environmental consequences of Alternative 1 (No Action) because the type and amount of insecticides that could be used in this scenario are unknown. However, APHIS is aware that in 2002, private parties applied furadan, Malathion, Carbaryl, and dimethoate for Mormon cricket and/or grasshopper control in Idaho.

Rangeland fires may be set by persons who desire suppression of the grasshoppers/Mormon crickets. Action of this type has not been documented, but individuals have threatened to set fires to destroy outbreaks that are not controlled.

Socioeconomic Issues

There is a risk that grasshopper/Mormon cricket outbreaks on rangeland would decrease the availability of forage for cattle and sheep. If sheep and cattle grazing become unprofitable, there may be disproportionate impact on the sheepherding and cattle raising professions. Sheepherders often belong to minority population groups.

Unchecked movement of grasshopper/Mormon cricket outbreaks into crops would result in crop loss and additional expenditures for insecticidal control in the crop fields. Organic farmers may suffer significant losses if outbreaks are not controlled on rangeland and emigrate to organic cropland.

Stakeholders have suggested that the federal government should compensate farmers for losses incurred when grasshoppers or Mormon crickets emigrate from public rangeland into crops. USDA Risk Management Agency currently offers multi-peril crop insurance which may compensate for losses due to insects if the policy holder utilizes appropriate pest control measures but those measures fail. Normally, payment of such claims is on the basis of failure of pest control spray practices due to untimely rainfall or some other natural event. USDA Farm Service Agency may be able to offer low interest loans when disasters are declared for various reasons, which can include grasshopper/Mormon cricket outbreaks. Skold and Davis (Skold & Davis, 1995) proposed a rangeland grasshopper/Mormon cricket insurance program. No authority currently exists within USDA for such a program.

Cultural Resources and Events
Grasshoppers and Mormon crickets were a source of protein for indigenous North American people. They are no longer used in this country as a human food source, except as a novelty or recreational experience. They are used for fish bait and for pet food. Selection of the No Action alternative would result in their abundant availability for these purposes.

Grasshopper and Mormon cricket populations at outbreak levels on rangeland could decrease the recreational satisfaction of some people utilizing rangeland resources, primarily those who do not like insects. Grasshopper/Mormon cricket populations at outbreak levels on rangeland could increase the recreational satisfaction of some people utilizing rangeland resources, primarily those who enjoy spectacular biological phenomena.

Artificial Surfaces
Grasshoppers/Mormon crickets can damage artificial surfaces by coating them with excrement and saliva, and by chewing off flaking paint or other protuberances. Grasshoppers/Mormon crickets have been reported as recently as 2002 (in Nebraska) to have eaten the paint off houses. There is a possibility that artificial surfaces might suffer some damage due to chewing by grasshoppers or Mormon crickets.

2. Alternative 2: Insecticide Applications at Conventional Rates and Complete Area Coverage

Under Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative, APHIS would participate in grasshopper/Mormon cricket suppression programs with the option of using one of the insecticides (Carbaryl, Diflubenzuron, or Malathion) depending upon the various factors related to the outbreak and the site-specific characteristics. The use of an insecticide would occur at the conventional rates:

- 16.0 fluid ounces (0.50 pound active ingredient (lb a.i.)) of Carbaryl spray per acre, or
- 10.0 pounds (0.50 lb a.i.) of 5 percent Carbaryl bait per acre, or
- 1.0 fluid ounce (0.016 lb a.i.) of Diflubenzuron per acre, or
- 8.0 fluid ounces (0.62 lb a.i.) of Malathion per acre.

APHIS would not apply more than a single treatment in an outbreak year to affected rangeland areas in an attempt to suppress grasshoppers or Mormon crickets.

Carbaryl
Carbaryl is of moderate acute oral toxicity to humans. The mode of toxic action of Carbaryl occurs through inhibition of acetylcholinesterase (AChE) function in the nervous system. This inhibition is reversible over time if exposure to Carbaryl ceases. The Environmental Protection Agency (EPA) has classified Carbaryl as "a possible human carcinogen" (Landolt, 1993). However, it is not considered to pose any mutagenic or genotoxic risk.

Potential exposures to the general public from conventional application rates are infrequent and of low magnitude. These low exposures to the public pose no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. The potential for adverse effects to workers is negligible if proper safety procedures are followed, including wearing the required protective clothing. Therefore, routine safety precautions are expected to provide adequate worker health protection.

Carbaryl is of moderate acute oral toxicity to mammals. Carbaryl applied at Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative rates is unlikely to be directly toxic to upland birds, mammals, or reptiles. Field studies have shown that Carbaryl applied as either ultra-low-volume (ULV) spray or bait at Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative rates posed little risk to killdeer, vesper sparrows, or golden eagles in the treatment areas. AChE inhibition at 40 to 60 percent can affect coordination, behavior, and foraging ability in vertebrates.

Multi-year studies conducted at several grasshopper treatment areas have shown AChE inhibition at levels of no more that 40 percent with most at less than 20 percent (McEwen, Althouse, & Peterson, Direct and indirect effects of grasshopper integrated pest management (GHIPM) chemicals and biologicals on non-target animal life, 1996) (McEwen, Petersen, & Althouse, Bio-indicator species for evaluating potential effects of pesticides on threatened and endangered wildlife., 1996) (Adams, 94). Carbaryl is not subject to significant bioaccumulation due to its low water solubility and low octanol-water partition coefficient (Dobroski, O'Neill, Donohue, & Curley, 1985).

Carbaryl will most likely affect non-target insects that are exposed to ULV Carbaryl spray or that consume Carbaryl bait within the treatment area. Field studies have shown that affected insect populations can recover rapidly and generally have suffered no long-term effects, including some insects that are particularly sensitive to Carbaryl, such as bees (Catangui, Fuller, & Walz, 1996). The use of Carbaryl in bait form generally has considerable environmental advantages over liquid insecticide applications: bait is easier than liquid spray applications to direct toward the target area, bait is more specific to grasshoppers/Mormon crickets, and bait affects fewer non-target organisms than sprays (Foster, 1996).

Should Carbaryl enter water, there is the potential to affect the aquatic invertebrate assemblage, especially amphipods. Field studies with Carbaryl concluded that there was no biologically significant effect on aquatic resources, although invertebrate downstream drift increased for a short period after treatment due to toxic effects (Beyers, Farmer, & Sikowski, 1995). Carbaryl is moderately toxic to most fish (Mayer & Ellersieck, 1986).

Diflubenzuron

The acute oral toxicity of Diflubenzuron formulations to humans ranges from very slight to slight. The most sensitive indicator of exposure and effects of Diflubenzuron in humans is the formation of methemoglobin (a compound in blood responsible for the transport of oxygen) in blood.

Potential exposures to the general public from Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative rates are infrequent and of low magnitude. These low exposures to the public pose no risk of methemoglobinemia (a condition where the heme iron in blood is chemically oxidized and lacks the ability to properly transport oxygen), direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Potential worker exposures are higher than the general public but are not expected to pose any risk of adverse health effects.

Because Diflubenzuron is a chitin inhibitor that disrupts insects from forming their exoskeleton, organisms without a chitinous exoskeleton, such as mammals, fish, and plants are largely unaffected by Diflubenzuron. In addition, adult insects including wild and cultivated bees, would be mostly unaffected by Diflubenzuron applications (Schroeder, Sutton, & Beavers, 1980) (Emmett & Archer, 1980).

Among birds, nestling growth rates, behavior data, and survival of wild American kestrels in Diflubenzuron treated areas showed no significant differences among kestrels in treated areas and untreated areas (McEwen, Petersen, & Althouse, Bio-indicator species for evaluating potential effects of pesticides on threatened and endangered wildlife., 1996). The acute oral toxicity of Diflubenzuron to mammals ranges from very slight to slight. Little, if any, bioaccumulation of Diflubenzuron would be expected (Opdycke, Miller, & Menzer, 1982).

Diflubenzuron is most likely to affect immature terrestrial insects and early life stages of aquatic invertebrates (Eisler, 2000). While this would reduce the prey base within the treatment area for organisms that feed on insects, adult insects, including grasshoppers, would remain available as prey items. Many of the aquatic organisms most susceptible to Diflubenzuron are marine organisms that would not be exposed to rangeland treatments. Freshwater invertebrate populations would be reduced if exposed to Diflubenzuron, but these decreases would be expected to be temporary given the rapid regeneration time of many aquatic invertebrates.

Malathion

Malathion is of slight acute oral toxicity to humans. The mode of toxic action of Malathion occurs through inhibition of AChE function in the nervous system. Unlike Carbaryl, AChE inhibition from Malathion is not readily reversible over time if exposure ceases. However, strong inhibition of AChE from Malathion occurs only when chemical oxidation results in formation of the metabolite Malaoxon. Human metabolism of Malathion favors hydroxylation and seldom produces much Malaoxon.

Potential exposures to the general public from conventional application rates are infrequent and of low magnitude. These low exposures to the public pose no risk of direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Potential worker exposures are higher, but still have little potential for adverse health effects except under accidental scenarios. Therefore, routine safety precautions are expected to continue to provide adequate protection of worker health.

The EPA has recently reviewed the potential for carcinogenic effects from Malathion. The EPA's classification describes Malathion as having "suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential" (U.S. Environmental Protection Agency, 2000). This indicates that any carcinogenic potential of Malathion cannot be quantified based upon the EPA's weight of evidence determination in this classification. The low exposures to Malathion from program applications would not be expected to pose carcinogenic risks to workers or the general public.

Malathion is of slight acute oral toxicity to mammals. There is little possibility of toxicity-induced mortality of upland birds, mammals, or reptiles, and no direct toxic effects have been observed in field studies. Malathion is not directly toxic to vertebrates at the concentrations used for grasshopper or Mormon cricket suppression, but it may be possible that sublethal effects to nervous system functions caused by AChE inhibition may lead directly to decreased survival. AChE inhibition at 40 to 60 percent can affect coordination, behavior, and foraging ability in vertebrates.

Multi-year studies at several grasshopper/Mormon cricket treatment areas have shown AChE inhibition at levels of no more than 40 percent with most at less than 20 percent. Field studies of birds within Malathion treatment areas showed that, in general, the total number of birds and bird reproduction were not different from untreated areas (McEwen, Althouse, & Peterson, Direct and indirect effects of grasshopper integrated pest management (GHIPM) chemicals and biologicals on non-target animal life, 1996). Malathion does not bioaccumulate (National Library of Medicine, 1990) (Tsuda, Aoki, Kojima, & Harada, 1989).

Malathion will most likely affect non-target insects within a treatment area. Large reductions in some insect populations would be expected after a Malathion treatment under Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative. While the number of insects would be diminished, there would be some insects remaining. The remaining insects would be available prey items for insectivorous organisms, and those insects with short generation times may soon increase.

Malathion is highly toxic to some fish and aquatic invertebrates; however, Malathion concentrations in water, as a result of grasshopper or Mormon cricket treatments, are expected to present a low risk to aquatic organisms, especially those organisms with short generation times.

Human Health

The implementation of pesticide label instructions and restrictions and the APHIS treatment guidelines will reduce potential impacts from the program use of insecticides (see Appendix 1 Treatment Guidelines).

Human exposure to insecticides would occur. Exposures and effects are discussed in the 2002 EIS pg. 39-40, 50, B10-B13, B22-B25, and B51-B53. Potential exposures of the general public to insecticides are infrequent and of low magnitude under this alternative. These low exposures to the public pose no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity.

Personnel working on the suppression program would be exposed during handling, loading, and application of the insecticides. Implementation of the Treatment Guidelines (Appendix 1) would minimize public exposure and protect workers from harmful exposure. The potential for adverse effects to workers is negligible if proper safety procedures are followed, including wearing the required protective clothing. Therefore, routine safety precautions are expected to provide adequate worker health protection.

Individuals with hypersensitivity to the insecticides might be affected. APHIS would offer to compile a list of persons who wish to be listed and would either avoid treating areas near their homes or would contact them prior to treatment. Hypersensitive individuals would be advised to avoid treatment blocks.

Some stakeholders have indicated that they are opposed to any treatments on public rangelands because they believe treatments would disrupt ecosystems, cause human health problems or provide an unacceptable advantage to agricultural interests. The anxiety levels of these stakeholders may be increased by adoption of this alternative versus the No Action Alternative.

Pesticide spills could expose individuals to excessive levels of insecticide. APHIS maintains spill kits and ensures that program personnel are familiar with procedures to mitigate effects associated with a spill.

Entomophobic persons may have reduced anxieties versus the No Action Alternative. Entomophilic persons may have increased anxieties versus the No Action Alternative.

Non-target Species

Fish and Aquatic Invertebrates

Insecticides have the potential to affect animals in aquatic ecosystems. Should they enter water, there is the potential to affect the aquatic invertebrate assemblage,

especially amphipods. Field studies concluded that there was no biologically significant effect on aquatic resources, although invertebrate downstream drift increased for a short period after treatment due to toxic effects (Beyers, Farmer, & Sikowski, 1995). Fish are not likely to be affected at any concentrations that could be expected under this alternative.

Although the risk of contamination of water must be rated higher than under the No Action Alternative, untreated buffer areas around all water would prevent entry of toxic concentrations into the water. Insecticide concentrations in runoff waters are addressed in the EIS pg. C-6. Under worst case scenarios, runoff from a storm intensity of one inch resulted in negligible concentration of insecticide in the runoff water. Probability charts generated by Western Regional Climate Center show that storm intensities of half that magnitude are extremely rare in the proposed project area.

Qualitative assessments and field studies reported in the 2002 EIS, pg. B46-B51 indicate that, under worst case scenarios, depressions of invertebrate populations might occur but the decreases would be temporary. No impacts would be expected on any vertebrate species.

Carbaryl is moderately toxic to most fish (Mayer & Ellersieck, 1986), very highly toxic to all aquatic insects, and highly to very highly toxic to most aquatic crustaceans. Should Carbaryl enter water, there is the potential to affect the aquatic invertebrate assemblage, especially amphipods. Field studies with Carbaryl concluded that there was no biologically significant effect on aquatic resources, although invertebrate downstream drift increased for a short period after treatment due to toxic effects (Beyers, Farmer, & Sikowski, 1995). Probability of exposure would be greater than under the No Action Alternative.

Diflubenzuron is slightly-to-practically nontoxic to fish, aquatic snails, and most bivalve species. The median lethal concentration of Diflubenzuron in water to the snail *Physa* sp. is greater than 125 mg/L. It is very highly toxic to most aquatic insects, crustaceans, horseshoe crabs, and barnacles. Diflubenzuron is most likely to affect immature terrestrial insects and early life stages of aquatic invertebrates (Eisler, 2000). Many of the aquatic organisms most susceptible to Diflubenzuron are marine organisms that would not be exposed to rangeland treatments. Freshwater invertebrate populations would be reduced if exposed to Diflubenzuron, but these decreases would be expected to be temporary given the rapid regeneration time of many aquatic invertebrates. Probability of exposure would be greater than under the No Action Alternative.

The acute toxicity of Malathion varies widely from slightly toxic to some species of fish to very highly toxic to other species. Malathion is moderately to very highly toxic to most aquatic invertebrates. The median lethal concentration of Malathion ranges from 0.5 g/L in the scud to 3,000 g/L in the aquatic sowbug. The median lethal concentration of Malathion to insects ranges from 0.69 g/L in the stonefly nymph to 385 g/L in snipe fly larvae. The median lethal concentration of Malathion

to a bivalve is 12 g/L. A No Effect Concentration was determined for mud snail to be 22,000 g/L. Malathion concentrations in water, as a result of grasshopper treatments, are expected to present a low risk to aquatic organisms, especially those organisms with short generation times. Probability of exposure would be greater than under the No Action Alternative.

Reptiles and Amphibians

Carbaryl is slightly-to-moderately toxic to amphibians and reptiles. The reference dose used in the 2002 EIS was 4000 mg/kg as an LD_{50} for bullfrog.

Diflubenzuron is slightly toxic to reptiles or amphibians. Based upon the selective nature of the toxic mode of action, the relative toxicity of Diflubenzuron to these species is anticipated to be similar to that of mammals and birds.

The toxicity of Malathion is relatively low to adult reptiles and amphibians, but Malathion is highly toxic to the immature aquatic stages. Studies of adult salamanders and lizards exposed to field applications (up to 6 oz. a.i./acre) of Malathion found no observable adverse effects and no AChE inhibition. The 96-hour median lethal concentration of Malathion is 420 g/L for tadpoles of Fowler's toad and 200 g/L for tadpoles of the western chorus frog.

Stakeholders have expressed concern about toxicity of pesticides to frogs in Owyhee County. Amphibians are relatively resistant to Diflubenzuron (Eisler, 2000). The acute oral LD_{50} of Carbaryl to bullfrogs is greater than 4000 mg/kg (Hudson, Tucker, & Haegele, 1984) indicating that Carbaryl is slightly toxic to amphibians. The toxicity of Malathion is relatively low to adult amphibians, but is highly toxic to aquatic stages (EIS pg. B-43). The EIS shows estimated daily doses and reference doses for Woodhouse's toad as follows under the full coverage alternative:

Treatment	Estimated Dose (mg/kg)	Reference 1/5 LD_{50}	Dose LD_{50}	Reference Species
Diflubenzuron	16.56	752	3,762	Red-winged blackbird
Carbaryl	62.95	156	780	Sharp-tailed Grouse
Malathion	74.02	30	150	Chicken

Mammals and Birds

Carbaryl is of moderate acute oral toxicity to mammals (McEwen, Althouse, & Peterson, Direct and indirect effects of grasshopper integrated pest management (GHIPM) chemicals and biologicals on non-target animal life, 1996).

The acute oral toxicity of Diflubenzuron to mammals ranges from very slight to slight. Little, if any, bioaccumulation of Diflubenzuron would be expected (Opdycke, Miller, & Menzer, 1982). Because Diflubenzuron is a chitin inhibitor that disrupts insects from forming their exoskeleton, organisms without a chitinous exoskeleton, such as mammals, are largely unaffected by Diflubenzuron.

The acute oral toxicity of Malathion is very slight to moderate for mammals. The acute oral median lethal doses of Malathion range from 250 mg/kg in rabbits to 12,500 mg/kg in rats. The acute toxicity of Malathion by the dermal route is one of the lowest of the organophosphorus insecticides.

Stakeholders have expressed concern about chronic and acute toxicity of insecticides to birds on rangeland. These concerns were well founded for Grasshopper and Mormon cricket control programs conducted throughout much of the 20th Century. Originally, inorganic insecticides were used with a typical bran bait formulation incorporating 8 pounds of liquid sodium arsenite into 100 pounds of bran (Cowan, 1929). For a brief span in the mid-20th Century, synthetic organochlorine insecticides such as chlordane, toxaphene, dieldrin, and aldrin came into use. These insecticides would accumulate in the birds or other animals which consumed poisoned grasshoppers, eventually leading to a toxic dosage level in the insectivores or their predators. USDA discontinued their recommendation for using organochlorine insecticides on grasshoppers and Mormon crickets in 1965 (McEwen L. C., 1972).

The organochlorine insecticides were replaced with the organophosphate and carbamate insecticides. Certain ones of these are highly toxic to birds. Blus *et al.* (Blus, et al., 1989) determined that sage grouse die-offs in Southeastern Idaho could be attributed to methamidophos and dimethoate treatments to agricultural fields used by the sage grouse. Martin *et al.* (Martin, Johnson, Forsyth, & Hill, 2000) determined that furadan treatments depressed cholinesterase levels in birds in study areas. APHIS protocols do not include insecticides (such as methamidophos, dimethoate, or furadan) that are highly toxic to birds or other terrestrial wildlife in the proposed suppression area.

Carbaryl applied at the proposed rate is unlikely to be directly toxic to upland birds, mammals, amphibians or reptiles. Carbaryl is not subject to significant bioaccumulation due to its low water solubility and low octanol-water partition coefficient (Dobroski, O'Neill, Donohue, & Curley, 1985).

Field studies have shown that Carbaryl applied as either ultra-low-volume (ULV) spray or bait at conventional rates posed little risk to killdeer, vesper sparrows, or golden eagles in the treatment areas (McEwen, Althouse, & Peterson, Direct and indirect effects of grasshopper integrated pest management (GHIPM) chemicals and biologicals on non-target animal life, 1996) (Adams, 94) (McEwen, Petersen, & Althouse, Bio-indicator species for evaluating potential effects of pesticides on threatened and endangered wildlife., 1996). AChE inhibition at 40 to 60 percent can affect coordination, behavior, and foraging ability in vertebrates. Multi-year studies conducted at several grasshopper/Mormon cricket treatment areas have shown AChE

inhibition at levels of no more that 40 percent with most at less than 20 percent (McEwen, Althouse, & Peterson, Direct and indirect effects of grasshopper integrated pest management (GHIPM) chemicals and biologicals on non-target animal life, 1996). The risk of acute or chronic toxicity to birds or mammals would be negligible under this option.

Diflubenzuron is slightly-to-very slightly toxic to birds. The primary concern for bird species is related to the effects of decreases in insect populations from insecticide applications on insectivorous species rather than to the direct toxicity to birds from Diflubenzuron exposure. Diflubenzuron is most likely to affect immature terrestrial insects and early life stages of aquatic invertebrates (Eisler, 2000). While this would reduce the prey base within the treatment area for organisms that feed on insects, adult insects, including grasshoppers and Mormon crickets, would remain available as prey items.

Among birds, nestling growth rates, behavior data and survival of wild American Kestrels in Diflubenzuron treated areas showed no significant differences among kestrels in treated areas and untreated areas (McEwen, Petersen, & Althouse, Bio-indicator species for evaluating potential effects of pesticides on threatened and endangered wildlife., 1996). Probability of exposure would be greater than under the No Action Alternative.

Malathion is slightly-to-moderately toxic to birds. The acute oral median lethal doses range from 150 mg/kg to chickens, to 1,485 mg/kg to mallard ducks. The 5-day dietary median lethal concentrations for wild birds all exceed 2,500 ppm. Several reproductive and developmental studies have been conducted with birds. The lowest median lethal dose to chicken embryos (eggs) was 3.99 mg per egg for 4-day embryos. The median lethal concentration for field applications of Malathion to mallard duck eggs was found to be 4.7 lbs. a.i./acre. No effect on reproductive capacity of chickens was found at dietary concentrations as high as 500 ppm in feed.

Malathion is not directly toxic to vertebrates at the concentrations used for grasshopper or Mormon cricket suppression, but it may be possible that sublethal effects to nervous system functions caused by AChE inhibition may lead directly to decreased survival. Field studies of birds within Malathion treatment areas showed that, in general, the total number of birds and bird reproduction were not different from untreated areas (McEwen, Althouse, & Peterson, Direct and indirect effects of grasshopper integrated pest management (GHIPM) chemicals and biologicals on non-target animal life, 1996). Malathion does not bioaccumulate (National Library of Medicine, 1990) (Tsuda, Aoki, Kojima, & Harada, 1989). However, probability of exposure would be greater than under the No Action Alternative.

Qualitative assessments and field studies reported in the 2002 EIS, pg. B36-B45, indicate that there would be negligible risk of adverse toxicological effects to most vertebrate species even when full coverage and traditional treatment rates (Carbaryl @ 0.50 lb. active ingredient /acre; Diflubenzuron @ 0.016 lb active ingredient /acre; and Malathion @ 0.62 lb active ingredient /acre) are used. Possible exceptions were

noted for the indicator species — grasshopper mouse, Bobwhite quail, American kestrel, and Woodhouse's toad. Individuals of these species might receive doses in excess of the calculated reference dose for 1/5 of the LD_{50} value (grasshopper mouse 60.37 mg/kg Carbaryl, Bobwhite quail 56.67 mg/kg, American kestrel 50.64 mg/kg, and Woodhouse's toad 74.02 mg/kg).

Bobwhite quail do not occur in or near the proposed treatment area, except for a few scattered locations in the Boise Valley. A species of concern, sage grouse, do occur in or near the proposed treatment area. The estimated daily dose of Malathion for sage grouse under the full coverage/traditional treatment rates method would be 13.91 mg/kg. The reference dose for 1/5 of the LD_{50} value would be 30 mg/kg. Therefore, no significant adverse toxicological effect would be expected on sage grouse, even at full coverage/traditional rates of applications.

George *et al.* (George, McEwen, & Fowler, 1992) surveyed birds on 13 grasshopper/Mormon cricket treatment blocks up to 37,000 acres in size in North Dakota, Utah, Colorado, Wyoming, and Idaho. They found little evidence of differences in bird population responses to treatments with Carbaryl bait, Carbaryl spray, *Nosema locustae* or Malathion.

Stakeholders have strongly expressed concern regarding the reduction of insects as a food source for rangeland insectivores, especially sage grouse and sharp-tailed grouse chicks. In this alternative, the application rates chosen for the insecticide is reduced from the maximum rate allowed by EPA. Because APHIS would only treat significant outbreak populations, numbers of grasshoppers or Mormon crickets surviving the treatment can provide ample nourishment for the insectivores. Additionally, Martin *et al.* (Martin, Johnson, Forsyth, & Hill, 2000) and Howe, *et al.* (Howe, Edwards, White, Beard, Wolfe, & Connor, 2000) found that Canadian grassland and Idaho shrub steppe bird species were able to make adaptive changes when insecticidal spray reduced the numbers and changed the composition of insect prey species. Prey available to insectivores would be less under this alternative than under the No Action Alternative.

APHIS will adhere to the BLM Instruction Memorandum No. 2012-043, which suggests avoiding treatments in sage-grouse habitat in May or June (or as appropriate to local circumstances) to provide insect availability for early development of Greater Sage-Grouse chicks.

Insects

Insecticides would affect non-target insects within the grasshopper/Mormon cricket treatment area. Field studies have shown that many affected insect populations can recover rapidly after spray or bait treatments and generally have suffered no long-term effects, including some insects that are particularly sensitive, such as bees (Catangui, Fuller, & Walz, 1996).

Non-target insect species which would be put at risk by treatments under this alternative include non-native biological control agents and pollinators. The level of

risk would be greater than the No Action Alternative. The majority of the nonnative biological control agents in the proposed suppression area result from release programs carried out by land management agencies and others. The Nez Perce Biological Control Center in Lapwai provides database service which allows managers to report locations of bio-control releases and the status of bio-control agent populations. APHIS would consult with land managers and the Nez Perce Biological Control Center to determine the location and status of biological control agent populations and would select treatment options (including buffering areas) which minimize negative impacts on the populations.

The most widespread, managed, nonnative pollinator in the proposed suppression area is the honeybee. Honeybees are found throughout and near the proposed suppression area. APHIS would provide beekeepers with notification of the suppression program and would conduct surveys to detect bee yards in or near proposed treatment blocks. Risk to honeybees would be greater than the risk under the No Action Alternative.

Managed native pollinators include leafcutter and alkali bees. These species might be found in the proposed treatment area, but they are usually encountered in crop areas adjacent to the rangeland. APHIS would conduct surveys and would consult with private landowners to determine if managed native pollinators are near proposed treatment blocks. Risk to managed native pollinators would be higher than the risk under the No Action Alternative.

Unmanaged native pollinators include a vast array of insects and other animals. Risk to unmanaged native pollinators would be greater than the risk under the No Action Alternative.

Insect Biodiversity

There might be a temporary decrease in insect biodiversity within treatment blocks.

Carbaryl bait would affect some non-target insects that consume the bait within the treatment area. Field studies have shown that affected insect populations can recover rapidly and generally have suffered no long-term effects, including some insects that are particularly sensitive to Carbaryl, such as bees (Catangui, Fuller, & Walz, 1996). The use of Carbaryl in bait form generally has considerable environmental advantages over liquid insecticide applications: bait is easier than liquid spray applications to direct toward the target area, bait is more specific to grasshoppers, and bait affects fewer non-target organisms than sprays (Quinn, 1996).

Diflubenzuron is most likely to affect immature terrestrial insects and early life stages of aquatic invertebrates (Eisler, 2000). In addition, adult insects, including wild and cultivated bees, would be mostly unaffected by Diflubenzuron applications (Schroeder, Sutton, & Beavers, 1980) (Emmett & Archer, 1980).

Malathion would most likely affect non-target insects within a treatment area. Large reductions in some insect populations would be expected after a Malathion treatment

under Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative. While the number of insects would be diminished, there would be some insects remaining. The remaining insects would be available prey items for insectivorous organisms, and those insects with short generation times may soon increase.

To maximize the protection of these organisms, APHIS would select Carbaryl bait or Diflubenzuron to suppress grasshopper/Mormon cricket outbreaks whenever possible. Risk to terrestrial invertebrates would be greater than the risk under the No Action Alternative.

Plants

Versus the No Action Alternative, grasshopper/Mormon cricket feeding damage would be reduced on rangeland plants, including desirable and undesirable plants, and to crops near rangeland.

Reduction of the feeding damage may be viewed as having both negative and positive impacts. Grasshoppers and Mormon crickets feed on invasive weeds such as rush skeletonweed. Limiting the damage caused to invasive weeds would be perceived by most observers as a negative impact, while limiting the damage to desirable plants would be perceived by most observers as a positive impact.

Decreasing the amount of foliage consumed by grasshoppers/Mormon crickets can make more forage available to other herbivores, which may be more highly valued by stakeholders. Livestock, game animals, and non-game animals compete with grasshoppers and Mormon crickets for forage and shelter in rangeland. This alternative would make more forage and shelter available for other species versus the No Action Alternative.

Because Diflubenzuron is a chitin inhibitor that disrupts insects from forming their exoskeleton, organisms without a chitinous exoskeleton are largely unaffected by Diflubenzuron.

None of the insecticides proposed for use in the program would be phytotoxic to shrubs, forbs or grasses at the rates proposed for use. There might be secondary effects on plant reproduction if the proposed treatment reduced pollinator populations in the proposed treatment area. Significant reduction in pollinators would not be expected with any of the proposed insecticides other than Malathion. Operational protocols would limit the use of Malathion.

There are no known studies indicating that insecticides may affect species composition of intact biological soil crusts (US Department of the Interior 2001).

Spills

Pesticide spills could expose wildlife to excessive levels of insecticide. APHIS maintains spill kits and ensures that program personnel are familiar with procedures to mitigate effects associated with a spill.

Socioeconomic issues
The risk that grasshopper and Mormon cricket outbreaks on rangeland would decrease the availability of forage for cattle and sheep is less than under the No Action Alternative because populations would be reduced on rangeland.

There would be reduced risk of major unchecked movement of grasshoppers/Mormon crickets into traditional or organic crops resulting in crop loss and additional expenditures for insecticidal control in the crop fields because the overall population would be reduced.

Cultural Resources and Events
The availability of grasshoppers/Mormon crickets for fish bait and other human uses would be reduced from outbreak levels to more normal levels. Persons using rangelands for recreation would respond to grasshoppers and Mormon crickets as they do under normal conditions versus under outbreak conditions.

Artificial Surfaces
Carbaryl and Malathion can damage some painted surfaces. Automotive and sign finishes are susceptible to damage by Carbaryl and Malathion, and automobile or sign owners could suffer economic loss repairing cosmetic damage. APHIS would not apply treatments to un-abandoned vehicles in treatment blocks. APHIS would consult with land managers to ensure that Native American petroglyphs are excluded from direct treatment if they occur within treatment blocks. The probability of damage to artificial surfaces by the treatments under this alternative is negligible.

Probability of damage to artificial surfaces by grasshoppers or Mormon crickets would be reduced versus the No Action Alternative.

3. Alternative 3: Reduced Agent Area Treatments (RAATs)

Under RAATs Alternative, APHIS would participate in grasshopper/Mormon crickets suppression programs with the option of using one of the insecticides (Carbaryl, Diflubenzuron or Malathion) depending upon the various factors related to the outbreak and the site-specific characteristics. The use of an insecticide would occur at reduced rates:

- 8.0 fluid ounces (0.25 lb a.i.) of Carbaryl spray per acre, or
- 10.0 pounds (0.20 lb a.i.) of 2 percent Carbaryl bait per acre, or
- 0.75 fluid ounce (0.012 lb a.i.) of Diflubenzuron per acre, or
- 4.0 fluid ounces (0.31 lb a.i.) of Malathion per acre.

With coverage reduced to less than 100% coverage of any and all treatment blocks, APHIS has generally applied the RAATs alternative with 50% coverage of rangeland spray blocks in the tall-grass and short-grass prairie areas where large treatments have occurred in recent years. For analysis here, APHIS will utilize assumption of 75% coverage for Idaho conditions and crop protection programs.

APHIS would not apply more than a single treatment in an outbreak year to affected rangeland areas in an attempt to suppress grasshoppers or Mormon crickets. APHIS would not apply a treatment for grasshoppers to an area which had already been treated for Mormon crickets during the current calendar year.

Carbaryl

Potential exposures to the general public and workers from RAATs application rates are 0.25 times for Carbaryl spray and 0.20 times for Carbaryl bait compared to conventional application rates, and adverse effects decrease commensurately with decreased magnitude of exposure. This estimate is based on 50% surface area coverage within a treatment block and the reduced rate of insecticide. These low exposures to the public pose no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. The potential for adverse effects to workers is negligible if proper safety procedures are followed, including wearing the required protective clothing. Routine safety precautions are expected to provide adequate protection of worker health at the lower application rates under RAATs.

Direct toxicity of Carbaryl to birds, mammals, and reptiles is unlikely in swaths treated with Carbaryl spray under a RAATs approach. Carbaryl bait also has minimal potential for direct effects on birds and mammals. Field studies indicated that bee populations did not decline after Carbaryl bait treatments, and American kestrels were unaffected by bait applications made at a RAATs rate (George, McEwen, & Fowler, 1992). Using alternating swaths will furthermore reduce adverse effects because organisms that are in untreated swaths will be mostly unexposed to Carbaryl.

Carbaryl applied at a RAATs rate has the potential to affect invertebrates in aquatic ecosystems if the insecticide should inadvertently enter water. However, these affects would be less than effects expected under Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative 2. Fish are not likely to be affected at any concentrations that could be expected under Reduced Agent Area Treatments (RAATs) Alternative.

While Carbaryl applied at a RAATs rate will reduce susceptible insect populations, the decrease will be less than under Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative rates. Carbaryl ULV applications applied in alternate swaths have been shown to affect terrestrial arthropods less than Malathion applied in a similar fashion.

Diflubenzuron

Potential exposures and adverse effects to the general public and workers from RAATs application rates are 0.375 times for Diflubenzuron compared to conventional application rates. This estimate is based on 50% surface area coverage within a treatment block and the reduced rate of insecticide. These low exposures to the public pose no risk of methemoglobinemia, direct toxicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity. Potential worker exposures pose negligible risk of adverse health effects.

Diflubenzuron exposures at Reduced Agent Area Treatments (RAATs) Alternative rates are not hazardous to terrestrial mammals, birds, and other vertebrates. Insects in untreated swaths would have little-to-no exposure, and adult insects in the treated swaths are not susceptible to Diflubenzuron's mode of action. The indirect effects to insectivores would be negligible as significant portions of the insect fauna in the treatment area will not be affected by Diflubenzuron.

Many of the aquatic organisms most susceptible to Diflubenzuron are marine organisms that would not be exposed to rangeland treatments. Freshwater invertebrate populations would be reduced if exposed to Diflubenzuron, but these decreases may be temporary given the rapid regeneration time of many aquatic invertebrates. Buffers around water would prevent significant amounts of Diflubenzuron from entering water in or near the treatment blocks.

Malathion

Compared to potential exposures under the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative, potential exposures under this Alternative are predicted at 0.25 times for Malathion spray. This estimate is based on 50% surface area coverage within a treatment block and the reduced rate of insecticide. These low exposures to the public pose no risk of direct toxicity, carcinogenicity, neurotoxicity, genotoxicity, reproductive toxicity, or developmental toxicity.

Malathion applied at a RAATs rate will cause mortalities to susceptible insects. Organisms in untreated areas will be mostly unaffected. Field applications of Malathion at a RAATs rate and applied in alternate swaths resulted in less reduction in non-target organisms than would occur in blanket treatments. Should Malathion applied at RAATs rates enter water, it is most likely to affect aquatic invertebrates. However, these effects would soon be compensated for by the surviving organisms, given the rapid generation time of most aquatic invertebrates and the rapid degradation of Malathion in most water bodies. Buffers around water would prevent significant amounts of Malathion from entering water in or near the treatment blocks.

Human Health

The implementation of pesticide label instructions and restrictions and the APHIS treatment guidelines will reduce potential impacts from the use of insecticides (see Appendix 1 Treatment Guidelines).

Personnel working on the suppression program would be exposed during handling, loading, and application of the insecticides. Implementation of the Treatment Guidelines (Appendix 1) would minimize public exposure and protect workers from harmful exposure. The potential for adverse effects to workers is negligible if proper safety procedures are followed, including wearing the required protective clothing. Therefore, routine safety precautions are expected to provide adequate worker health protection. Decrease in potential worker exposure under this alternative should be equivalent to the decrease for the general public.

Individuals with hypersensitivity to the insecticides might be affected. APHIS would offer to compile a list of persons who wish to be listed and would either avoid treating areas near their homes or would contact them prior to treatment. If treatments were scheduled near the domiciles of known hypersensitive individuals, they would be advised to avoid treatment blocks. Decrease in potential for exposure would probably be equivalent to the decrease for the general public.

Some stakeholders have indicated that they are opposed to any treatments on public rangelands because they believe treatments would disrupt ecosystems, cause human health problems or provide an unacceptable advantage to agricultural interests. The anxiety levels of these stakeholders may be increased by adoption of this alternative versus the No Action Alternative. Their anxiety level may be equivalent with any alternative which includes insecticide applications.

Chances of a pesticide spill would decrease approximately 50% versus the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative.

Entomophobic persons may have reduced anxieties versus the No Action Alternative. Entomophilic persons may have increased anxieties versus the No Action Alternative.

Non-Target Species

Aquatic

Fish are not likely to be affected at any concentrations that could be expected under this Alternative. Although the risk of contamination of water must be rated higher than under the No Action Alternative, untreated buffer areas around all water would prevent entry of toxic concentrations of Carbaryl into the water. Compared to potential exposures under Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative potential exposures under this Alternative are predicted at: 0.25 times for Carbaryl spray, 0.20 times for Carbaryl bait, 0.375 times for Diflubenzuron, and 0.25 times for Malathion spray.

These estimates are based on 50% surface area coverage within a treatment block and the reduced rates of insecticide. Insecticide concentrations in runoff waters are addressed in the EIS pg. C-6. Under worst case scenarios, runoff from a storm intensity of one inch resulted in negligible concentration of insecticide in the runoff water. Probability charts generated by Western Regional Climate Center show that storm intensities of half that magnitude are extremely rare in the proposed project area.

Mammals and Birds

Insecticides applied at the proposed rates are unlikely to be directly toxic to upland birds, mammals, or reptiles. The proposed insecticides are not subject to significant bioaccumulation in animals. The risk of acute or chronic toxicity to birds or mammals would be correspondingly less under this option than under Insecticide

Applications at Conventional Rates and Complete Area Coverage Alternative due to reduced rates and percentage area covered.

The reduction in rate and coverage leaves alternative insect fauna for foraging insectivores (Paige & Ritter, 1999). Because APHIS would only treat significant outbreak populations, numbers of grasshoppers surviving the treatment can provide ample nourishment for the insectivores. Additionally, Martin, *et al*. (Martin, Johnson, Forsyth, & Hill, 2000) and Howe, *et al.* (Howe, Edwards, White, Beard, Wolfe, & Connor, 2000) found that Canadian grassland and Idaho shrub steppe bird species were able to make adaptive changes when insecticidal spray reduced the numbers and changed the composition of insect prey species. Prey available to insectivores should be somewhat less under this alternative than under the No Action Alternative and somewhat more than under Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative.

Insects

The level of risk to non-target insects including honeybees, managed native pollinators, and unmanaged native pollinators would be greater than the No Action Alternative and less than the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative. APHIS would consult with land managers and the Nez Perce Biological Control Center to determine the location and status of biological control agent populations and would select treatment options (including buffering areas) which minimize negative impacts on the populations. To maximize the protection of these organisms, APHIS would select Carbaryl bait or Diflubenzuron whenever possible to suppress grasshopper/Mormon cricket outbreaks.

Insect biodiversity

There might be a temporary decrease in insect biodiversity within treatment blocks compared to the No Action Alternative. However, the areas left untreated within treatment blocks preserve biodiversity to a great extent.

Plants

Versus the No Action Alternative, grasshopper/Mormon cricket feeding damage would be reduced on rangeland plants, including desirable and undesirable plants, and to crops near rangeland.

Versus the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative, feeding damage would be increased on rangeland plants, including desirable and undesirable plants, and to crops near rangeland.

Reduction of the feeding damage may be viewed as having both negative and positive impacts. Grasshoppers and Mormon crickets feed on invasive weeds such as rush skeletonweed. Limiting the damage caused to invasive weeds would be perceived by most observers as a negative impact, while limiting the damage to desirable plants would be perceived by most observers as a positive impact.

Decreasing the amount of foliage consumed by grasshoppers/Mormon crickets can make more forage available to other herbivores which may be more highly valued by

stakeholders. Livestock and game animals and non-game compete with grasshoppers and Mormon crickets for forage and shelter in rangeland. This alternative would make more forage and shelter available for other species versus the No Action Alternative. It would make less forage and shelter available for other species versus the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative.

There are no known studies indicating that insecticides may affect species composition of intact biological soil crusts (US Department of the Interior 2001).

Spills

The risk of pesticide spills would be decreased approximately 50% versus the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative.

Socioeconomic Issues

The risk of grasshopper/Mormon cricket outbreaks on rangeland decreasing the availability of forage for cattle and sheep is less than under the No Action Alternative and greater than under the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative.

Versus the No Action Alternative, there would be reduced risk of major unchecked movement of grasshoppers or Mormon crickets into traditional or organic crops. Therefore, crop losses and additional expenditures for insecticidal control in the crop fields would be reduced. The risk of unchecked movement is greater under this alternative than under the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative.

Cultural Resources and Events

The availability of grasshoppers or Mormon crickets for fish bait and other human uses would be reduced from outbreak levels to more normal levels. Persons using rangelands for recreation would respond to grasshoppers/Mormon crickets as they do under normal conditions versus under outbreak conditions. Availability of grasshoppers/Mormon crickets would be greater under this alternative than under the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative.

Artificial Surfaces

APHIS would not apply insecticides to un-abandoned vehicles in treatment blocks. APHIS would consult with land managers to insure that Native American petroglyphs are excluded from direct treatment if they occur within treatment blocks.

The probability of damage to artificial surfaces by the treatments under this alternative is negligible. Probability of damage to artificial surfaces by grasshoppers or Mormon crickets would be reduced versus the No Action Alternative. The reduction in risk of damage to artificial surfaces by grasshoppers or Mormon crickets is less under this alternative than under the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative.

4. Alternative 4: Modified Reduced Agent Area Treatments (MRAATs) - Preferred Alternative

Under Modified RAATs Alternative, APHIS would participate in grasshopper/Mormon cricket suppression programs with the option of using one of the insecticides (Carbaryl, Diflubenzuron, or Malathion) depending upon the various factors related to the outbreak and the site-specific characteristics. The use of an insecticide would occur at rates:

- 10.0 pounds (0.50 lb a.i.) of 5 percent Carbaryl bait per acre, or
- 10.0 pounds (0.20 lb a.i.) of 2 percent Carbaryl bait per acre, or
- 0.75 fluid ounce (0.012 lb a.i.) of Diflubenzuron per acre, or
- 6.0 fluid ounces (0.465 lb a.i.) of Malathion per acre.

And with coverage reduced to <1% to 75% of any and all treatment blocks of grassland and <1% to 50% of any and all treatment blocks of sagebrush steppe.

APHIS has chosen MRAATs as the preferred alternative rather than any of the alternatives described in the 2002 EIS because:

Under Idaho conditions Diflubenzuron should be an adequate alternative to Carbaryl spray. Both are normally used as early season treatments and Diflubenzuron is less toxic to non-target organisms.

In some cases, the 2% bait option might be adequate; but in other cases, 5% bait might be required for quicker control.

Malathion might be required for some later season treatments when grasshoppers/Mormon crickets are in very high populations and are immediately threatening crops.

APHIS would not apply more than a single treatment in an outbreak year to affected rangeland areas in an attempt to suppress grasshoppers or Mormon crickets. APHIS would not apply a treatment for grasshoppers to an area which had already been treated for Mormon crickets during the current calendar year.

Carbaryl

Potential exposures and adverse effects resulting from Carbaryl bait treatments under this alternative could be increased up to 2.5 times versus Reduced Agent Area Treatments (RAATs) Alternative, and decreased 0.5 times versus Insecticide

Applications at Conventional Rates and Complete Area Coverage Alternative. No Carbaryl spray would be used under this alternative.

Diflubenzuron
Potential exposures and adverse effects resulting from Diflubenzuron treatments under this alternative would be equal to those under Reduced Agent Area Treatments (RAATs) Alternative.

Malathion
Probability of exposure to Malathion would be greater than under the No Action Alternative and the RAATS Alternative, but lessened compared to the Conventional Rates and Complete Coverage Alternative. Additionally, the percentage of the treatment block, which actually receives direct treatment, would not exceed 75% of the treatment block.

General
The implementation of pesticide label instructions and restrictions and the APHIS treatment guidelines will reduce potential impacts from the program use of insecticides (see Appendix 1 Treatment Guidelines).

Personnel working on the suppression program would be exposed during handling, loading, and application of the insecticides. Implementation of the Treatment Guidelines (Appendix 1) would minimize public exposure and protect workers from harmful exposure. The potential for adverse effects to workers is negligible if proper safety procedures are followed, including wearing the required protective clothing. Therefore, routine safety precautions are expected to provide adequate worker health protection. Decrease in potential worker exposure under this Alternative should be equivalent to the decrease for the general public.

Individuals with hypersensitivity to the insecticides might be affected. APHIS would offer to compile a list of persons who wish to be listed and would either avoid treating areas near their homes or would contact them prior to treatment. If treatments were scheduled near the domiciles of known hypersensitive individuals, they would be advised to avoid treatment blocks. Decrease in potential for exposure would probably be equivalent to the decrease for the general public.

Some stakeholders have indicated that they are opposed to any treatments on public rangelands because they believe treatments would disrupt ecosystems, cause human health problems or provide an unacceptable advantage to agricultural interests. The anxiety levels of these stakeholders may be increased by adoption of this alternative versus the No Action Alternative. Their anxiety level may be equivalent with any alternative which includes insecticide applications.

Entomophobic persons may have reduced anxieties vs. the No Acton Alternative. Entomophilic persons may have increased anxieties vs. the No Acton Alternative.

Non-Target Species

Aquatic
Fish are not likely to be affected at any concentrations that could be expected under this alternative. Although the risk of contamination of water must be rated higher than under the No Action Alternative, untreated buffer areas around all water would prevent entry of toxic concentrations of Carbaryl or Diflubenzuron into the water. Compared to potential exposures under Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative, potential exposures under this alternative are predicted at: 0.375 times for Diflubenzuron and 0.5 times for Carbaryl bait. These estimates are based on 50% surface area coverage within a treatment block and the rates of insecticide. Insecticide concentrations in runoff waters are addressed in the EIS pg. C-6. Under worst case scenarios, runoff from a storm intensity of one inch resulted in negligible concentration of insecticide in the runoff water. Probability charts generated by Western Regional Climate Center show that storm intensities of half that magnitude are extremely rare in the proposed project area.

Mammals and birds
Insecticides applied at the proposed rates are unlikely to be directly toxic to upland birds, mammals, or reptiles. The proposed insecticides are not subject to significant bioaccumulation in animals.

The risk of acute or chronic toxicity to birds or mammals would be less under this option than under Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative and RAATS Alternative.

Prey available to insectivores should be somewhat less under this alternative than under the No Action Alternative, and more than under the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative and RAATs Alternatives.

Insects
The level of risk to non-target insects including honeybees, managed native pollinators, and unmanaged native pollinators would be slightly greater than the No Action Alternative. APHIS would consult with land managers and the Nez Perce Biological Control Center to determine the location and status of biological control agent populations and would select treatment options (including buffering areas) which minimize negative impacts on the populations.

Insect Biodiversity
There might be a temporary decrease in insect biodiversity within treatment blocks compared to the No Action Alternative. Effects on insect biodiversity would be intermediate between applications at Conventional Rates and Complete Area Coverage Alternative and the RAATS alternative.

Plants
Versus the No Action Alternative, grasshopper and Mormon cricket feeding damage would be reduced on rangeland plants, including desirable and undesirable plants, and to crops near rangeland.

Versus the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative and RAATs Alternative, feeding damage would be increased on rangeland plants, including desirable and undesirable plants, and to crops near rangeland.

This alternative would make more forage and shelter available for other species versus the No Action Alternative. It would make less forage and shelter available for other species versus the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative and the RAATs Alternative.

There are no known studies indicating that insecticides may affect species composition of intact biological soil crusts (US Department of the Interior 2001).

Socioeconomic Issues
The risk of grasshopper/Mormon cricket outbreaks on rangeland decreasing the availability of forage for cattle and sheep is less than under the No Action Alternative and the RAATS Alternative and greater than under the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative.

Versus the No Action Alternative, there would be reduced risk of major unchecked movement of grasshoppers and Mormon crickets into traditional or organic crops. Therefore, crop losses and additional expenditures for insecticidal control in the crop fields would be reduced. The risk of unchecked movement is greater under this alternative than under the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative, and less than under the RAATs Alternative.

Cultural Resources and Events
Availability of grasshoppers/Mormon crickets for fish bait and other purposes would be greater under this alternative than under the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative, but would be less than under the RAATs Alternative.

Artificial Surfaces
The probability of damage to artificial surfaces by the treatments under this alternative is nil. Probability of damage to artificial surfaces by grasshoppers or Mormon crickets would be reduced versus the No Action Alternative. The reduction

in risk of damage to artificial surfaces by grasshoppers is less under this alternative than under the Insecticide Applications at Conventional Rates and Complete Area Coverage Alternative, and greater than under the RAATs Alternative.

B. Other Environmental Considerations

1. Cumulative Impacts, Synergistic Effects, Inert Ingredients, and Metabolites

Cumulative impact, as defined in the CEQ NEPA implementing regulations (40 CFR § 1508.7), "is the impact on the environment which results from the incremental impact of the action when added to the past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

Depending on the specific exposure scenario and the nature of the available data, the consequences of cumulative exposures are assessed in a variety of ways in the 2002 EIS.

Some individuals may be exposed to more than one treatment type, either in their job as applicators or because they frequent areas where different types of treatment are applied. Such exposures are considered connected actions; that is, one or more actions that an individual may take that could affect the individual's risk to the insecticides used to suppress grasshoppers and Mormon crickets. In addition, all individuals are exposed to a multitude of chemicals and biological organisms every day in foods, medicines, household products, and other environmental chemicals.

Mosquito abatement programs might apply pesticides in or near areas under consideration for rangeland grasshopper and Mormon cricket suppression programs. If they did apply insecticides over rangeland, there would be no need for grasshopper/Mormon cricket suppression treatments because the insecticides used for mosquitoes would exert control on the grasshoppers and Mormon crickets. If mosquito abatement treatments were applied to water within or near areas under consideration for rangeland grasshopper/Mormon cricket suppression programs, there would be no cumulative effect because the grasshopper/Mormon cricket program would not apply insecticides to water.

Grasshopper/Mormon cricket suppression treatments might occur on rangelands in the Affected Environment under consideration of this EA. In that case, treatments would be conducted by APHIS. APHIS would insure that all applications were within the limits for annual pesticide application of a single insecticide under FIFRA and that no treatments were made with synergistic insecticides.

Rangeland grasshopper and/or Mormon cricket suppression programs might be made on rangeland adjacent to the Affected Environment. In that case they would be made by ISDA or by private individuals. APHIS and ISDA maintain close liaison

regarding their respective grasshopper survey and suppression programs, so APHIS would be aware when ISDA had conducted or planned to conduct a suppression program. In that case, APHIS would plan any adjacent suppression programs on federally managed lands in a way that would be complimentary to the ISDA program. APHIS employees are in contact with private landowners and are generally aware when landowners have made or plan to make treatments in areas adjacent to federally managed rangelands where APHIS might conduct suppression programs. In that case, APHIS would plan any adjacent suppression programs on federally managed lands in a way that would be complimentary to the private program.

In some cases, unknown parties have applied treatments for grasshoppers or Mormon crickets on public and private rangeland. These treatments are easy to detect because of the presence of dead grasshoppers or Mormon crickets. However, absent visible bait or the distinctive odor of an insecticide such as Malathion, acephate, or furadan, APHIS cannot determine what insecticide may have been used. In those cases, APHIS would refrain from conducting suppression programs in the immediate vicinity. Applications on federally managed rangelands by unknown parties can be minimized by proactive participation in suppression programs by APHIS, which remove the concerns of the parties who would otherwise conduct clandestine treatments. APHIS can be most proactive if logistically expedient treatment methods are available. Spray treatments are more logistically expedient than bait treatments.

Federal land managers may utilize various herbicides to control weeds within the proposed suppression area. APHIS would consult with land managers to determine if herbicides or insecticides have been utilized within the past year on any proposed spray block within the proposed suppression area. APHIS would not apply any insecticide in a manner that conflicts with EPA requirements regarding multiple treatments. APHIS would not apply insecticide to an area known to have been treated within one (1) year with a pesticide known to have cumulative or synergistic effects with the insecticide selected for application by APHIS.

Carbaryl

The only studies of chemical interactions with Carbaryl indicate that toxicity of organophosphates combined with Carbaryl is additive, not synergistic (2002 EIS p B-13).

Although the formulations of Carbaryl in some previous spray programs had oil-based carriers (i.e., Sevin 4-oil), current programs have converted to water-based carriers (i.e., Sevin XLR Plus). Some information about inert ingredients in these formulations is available. One inert ingredient is propylene glycol or propanediol (antifreeze agent). It degrades readily to carbon dioxide and water in soil and water environments after applications, so actual exposures from the rangeland grasshopper/Mormon cricket suppression program would only be acute. The low exposures to humans would not expect to have human health effects, except to those few individuals experiencing allergic contact dermatitis. Since APHIS would use bait

rather than spray formulations, there should be no contact with the skin of any humans, except program personnel. Propylene glycol is practically nontoxic to fish and daphnia. Concentrations of propylene glycol from program application rates would not be anticipated to result in adverse effects to wildlife.

Carbaryl 5% bait is formulated by different manufacturers with a number of different substrates for the bait. Substrates include whole rolled wheat, wheat bran, and grape and apple pomace. For use in Idaho, APHIS normally prefers the formulation based on grape and apple pomace. N-amyl acetate or "banana oil" may be used as a flavor additive in Carbaryl bait. N-amyl acetate readily volatilizes to the atmosphere. Biodegradation occurs readily in soil, but there is moderate potential for bioconcentration in aquatic organisms. Although this compound is an irritant of skin, eyes, and mucus membranes, the low potential exposures from program applications of Carbaryl bait are not expected to result in any adverse effects to humans.

While N-amyl acetate may bioconcentrate in aquatic organisms, the toxicity to those species is low relative to the active ingredient (Carbaryl) in the formulation. The major hydrolytic metabolites of Carbaryl are glucuronides and sulfates. Most metabolites such as naphthol are considerably less toxic than Carbaryl. There has been some concern expressed about the reaction of Carbaryl with nitrite under certain circumstances. This may result in the formation of N-nitrosoCarbaryl which has been shown to be mutagenic and carcinogenic in laboratory tests (2002 EIS pg. B12-B13).

Diflubenzuron

Diflubenzuron is only reported to be synergistic with the defoliant DEF. However, Diflubenzuron has potential for synergistic effects with non-pesticidal compounds such as cigarette smoke and carbon monoxide which bind with hemoglobin (2002 EIS, pg. B-16).

The primary metabolites of Diflubenzuron are 4-chlorophenylurea (CPU) and 2.6-difluorobenzoic acid. The acid metabolite is further metabolized by microorganisms in one (1) to two (2) weeks in soil. The CPU degrades in soil in about five (5) weeks. The rapid metabolism and degradation of this metabolite's low concentrations make it highly unlikely that there would be sufficient exposure to cause any of the adverse toxicological effects noted in these studies. Various carriers and adjuvants are used with Diflubenzuron to enhance the pesticide applications. These are primarily synthetic and naturals oils. These inert ingredients may include light and heavy paraffinic oils, polyethylene glycol nonylphenyl ether, alkylaryl polyether-ethanols, vegetable oil surfactants, and canola oil. Food-grade canola oil would not be expected to pose any noteworthy hazards, but some of the heavier oils could affect birds and other wildlife.

Use of formulations that use the paraffinic oils may not be appropriate in some habitats with nesting birds, particularly if endangered or threatened species are present or protection of game birds is an issue. Although the paraffinic oils have been shown to decrease egg-hatch of nesting birds, these effects have only been observed from spills or exposures higher than are anticipated from program applications.

Polyethylene glycol nonylphenyl ether has generally not been of human health concern, except for a few cases of allergic contact dermatitis. This should not be an issue if proper program safety precautions are followed. This compound does not persist in natural environments and is unlikely to show bioconcentration of residues (2002 EIS pg. B15-B16).

Malathion

Malathion is synergistic with Diazinon and may be potentiated by other organophosphate and carbamate insecticides. Studies with Dichlorvos and Naled showed that toxicity was additive, not synergistic (2002 EIS pg. B-20).

The main impurities of concern in Malathion formulations are isoMalathion (95 times as toxic as Malathion) and Malaoxon (68 times as toxic as Malathion). IsoMalathion formation results from improper storage or handling of Malathion formulations. Malaoxon is formed from Malathion's oxidation, which has been reported to occur in air and from volatilization from droplets on various surfaces. Following aerial Malathion applications, Malaoxon and other transformation products were detectable in air and on various test surfaces for hours and, in some cases, days after the treatment. Levels of Malaoxon increased, presumably via oxidation of Malathion on some test surfaces for the nine days of the study. Some petroleum-based oil occurs in some ULV formulations. The exposure of birds' eggs and humans to this oil has been shown to have no adverse effects at program application rates (2002 EIS pg. B20-B21).

2. Executive Order No. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations

Although specific data are not available, observations indicate that Hispanics and Asians are the minority groups which would be most impacted by the suppression programs because of their involvement in agricultural production systems.

No Action Alternative may cause Hispanic and Asian farm workers to be exposed to additional insecticides applied to cropland. No Action Alternative may increase costs of operation for Asian and Hispanic farm operators. The other alternatives would have no disproportionate impact on minority or low income populations.

Differential human health effects of Carbaryl on individuals with poor nutritional status are analyzed in the 2002 EIS pg. B-25.

3. Executive Order No. 13045, Protection of Children from Environmental Health Risks and Safety Risks

The human health risk assessment for the 2002 EIS analyzed the effects of exposure of children to program insecticides (pg. B24-B29). Based on review of the insecticides and their use in the Grasshopper/Mormon Cricket Program, the risk assessment concluded that the likelihood of children being exposed to insecticides is very slight, and that no disproportionate adverse effects to children are anticipated over the negligible effects to the general population. Treatments are conducted on

open rangelands where children would not be expected to be present. No urban areas or schools would be subject to treatment under the proposed action.

Potential for impacts of pesticides on children would be minimized by the implementation of the treatment guidelines, standard operational procedures, and added measures included in IV.C.4.

4. Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

In accordance with various environmental statutes, APHIS routinely conducts programs in a manner that minimizes impact to the environment, including any impact to migratory birds. In January 2001, President Clinton signed Executive Order (EO) No. 13186 to ensure that all government programs protect migratory birds to the extent practicable. To further its purposes, the E.O. requires each agency with a potential to impact migratory birds to enter into a Memorandum of Understanding (MOU) with the U.S. Fish and Wildlife Service (USFWS). In compliance with the E.O., APHIS and the USFWS signed such an MOU in 2012...

5. Endangered Species Act

Policies and procedures for protecting endangered and threatened species of wildlife and plants were established by the Endangered Species Act (ESA) of 1973, as amended (16 United States Code (U.S.C.) 1531 et seq.). The ESA is designed to ensure the protection of endangered and threatened species and the habitats upon which they depend for survival. Regulations implementing the provisions of the ESA have been issued.

In accordance with Section 7 of the ESA, consultation is to be conducted for any action authorized, funded, or carried out by a Federal agency that may affect listed endangered or threatened species or their habitats. APHIS includes proposed species in their consultations. Consultations are conducted with Fish and Wildlife Service (USFWS) for terrestrial species and most aquatic species and with the NOAA Fisheries for marine and anadromous species.

The most recent national biological opinion on the Grasshopper/Mormon Cricket Program was issued by USFWS July 21, 1995. In following years, no national biological assessment was prepared since control programs were not anticipated in most states due to lack of funding. A national biological assessment for the Rangeland Grasshopper and Mormon Cricket Suppression Program is currently under way, but the process for its completion and consideration by USFWS will not be concluded in time for the 2015 season. In order to comply with the Section 7 requirements, APHIS conducts ongoing informal consultations with USFWS locally.

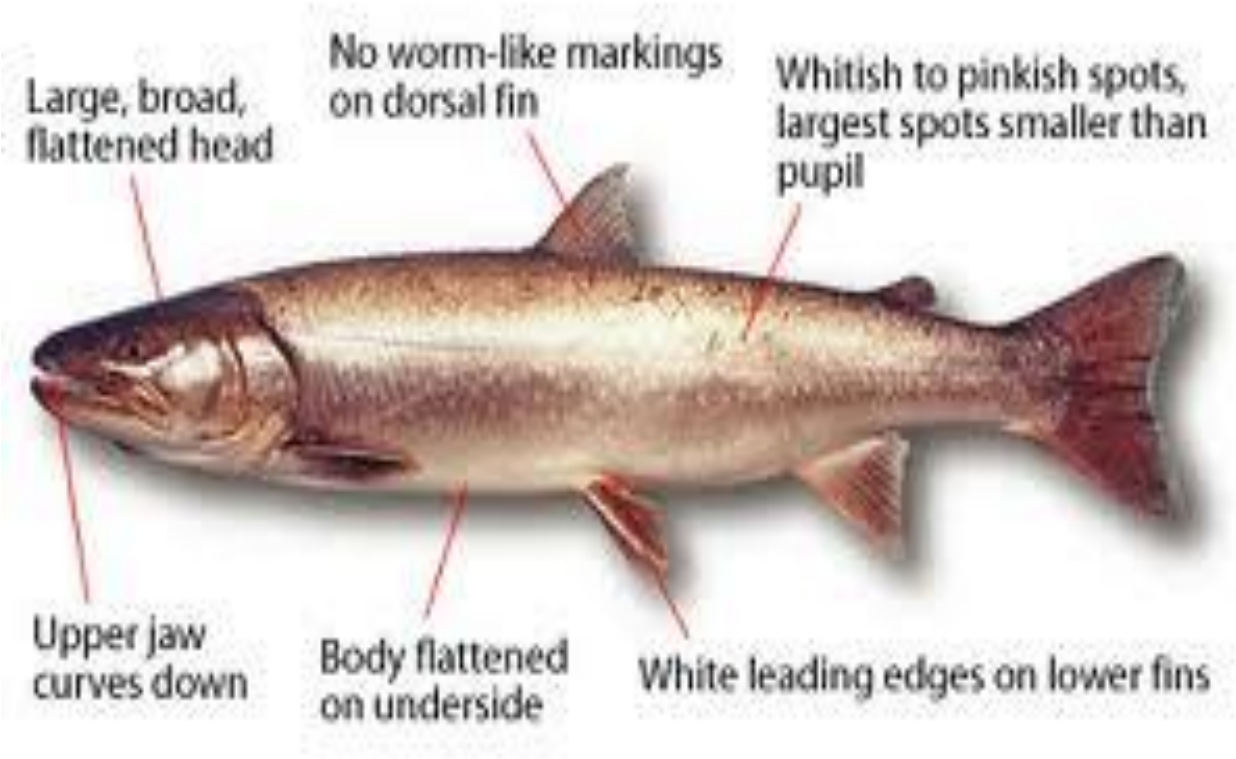
The 1995 Biological Opinion and 1998 Biological Assessment will be used as a basis for these local consultations and are incorporated into this EA by reference. They are available for public inspection at 9118 West Blackeagle Drive, Boise, Idaho. For this EA, APHIS conducted informal consultation with USFWS, Snake River Basin

Office, and arrived at determinations of protective measures which were needed, in addition to those derived from earlier Biological Opinions. APHIS conferred with NOAA Fisheries - Boise, Idaho Office and determined that consultation was not required if the proposed suppression area excluded watersheds of the Salmon River and the Snake River below Brownlee Dam.

Listed Endangered or Threatened Species

The proposed project area may contain suitable habitat for federally listed Threatened, Endangered or Candidate species. Protection measures and findings of no jeopardy or no effect without buffers or other measures previously approved by USFWS are referenced by the date of the biological opinion: (USFWS dd/mm/yy). Measures developed locally by APHIS and USFWS are referenced: (USFWS yyyy).

Bull Trout, *Salvelinus confluentus* – Threatened



Bull trout have been listed as threatened under the ESA. Within the area in Idaho included in the proposal, bull trout are distributed throughout the Payette, Weiser, and Boise River systems. Bull trout naturally exhibit a patchy distribution and will not likely occupy all areas of these basins at once. Proposed or designated bull trout critical habitat may also be distributed throughout these basins, and includes some habitat that is not currently known to be occupied. A very general description of bull trout distribution would include the North, Middle, and South Fork Payette Rivers; Squaw Creek; the Weiser River Watershed; the Jarbidge and Bruneau Rivers; and the

Main Boise and South Fork Boise Rivers, including Anderson Ranch, Arrowrock, and Lucky Peak Reservoirs.

In all areas occupied by bull trout (including designated critical habitat), APHIS would utilize a 500 foot buffer for Carbaryl bait. For applications of Diflubenzuron or Malathion, a 0.5 mile buffer would be maintained. If there are treatment needs within the buffer area, APHIS would consult with USFWS on a case-by-case basis to examine alternatives (USFWS 2003).

Banbury Springs Limpet (lanx), *Lanx sp.* - Endangered
Bliss Rapids Snail, *Taylorconcha serpenticola* - Threatened
Snake River Physa Snail, *Physa natricina* - Endangered

The Banbury Springs Limpet is known to occur at three (3) sites in the Thousand Springs area near Hagerman, Idaho. It has only been found on cobble or boulder substrates in cool, clear, well-oxygenated water. All known populations have occurred in swift currents.

The Bliss Rapids Snail has primarily been found on cobble-boulder substrate in flowing reaches of the main stem Snake River and alcove springs. River populations have been found in spring-influenced habitat or near the edge of rapids. Most populations occur in the Hagerman Reach, the tailwaters of Bliss and Lower Salmon Falls dams, large alcove springs, and springs on the Fort Hall Indian Reservation upstream of American Falls Reservoir.

The Snake River Physa Snail is a main-stem Snake River specie, which occurs along stretches of the Snake River near the proposed program area.

In areas along the Snake River between C.J. Strike Reservoir and American Falls Reservoir, APHIS would utilize 500 foot buffer for Carbaryl bait. For aerial applications of Diflubenzuron or Malathion, a 0.5 mile buffer would be maintained. If there are treatment needs within the buffer area, APHIS would consult with USFWS on a case-by-case basis to examine alternatives (USFWS 2003).

Bruneau Hot Springsnail, *Pyrgulopsis bruneauensis* – Endangered
This freshwater snail occurs in a 5-mile reach of the Bruneau River and the lower one third of its tributary, Hot Creek, in Owyhee County, Idaho. The snail is native to geothermal springs and seeps, with temperatures ranging from 15.7 to 36.9 degrees Celsius. It is found in these habitats on the exposed surfaces of various substrates including rocks, sand, gravel, mud, and algal films.

Within the recovery area, as defined in the BHSS Recovery Plan, APHIS would maintain a 0.5 mile buffer for all aerial sprays, and a 500 foot buffer for Carbaryl bait. If there are treatment needs within the buffer, APHIS will consult with USFWS on a case- by-case basis (USFWS 2003).

Canada Lynx, *Lynx canadensis* – Threatened

On March 24, 2000, the U. S. Fish and Wildlife Service listed the Canada Lynx as a Threatened species under the ESA of 1973, as amended. This took effect on April 24, 2000. The proposed treatment areas may contain habitat conditions suitable for Canada Lynx foraging, movement, and dispersal activities. In Idaho, lynx are thought to primarily occur in the higher elevation cold forest habitats, which support spruce, subalpine fir, whitebark pine, and lodgepole pine. Shrub/steppe habitats, which occur adjacent to or are intermixed with cold forest habitats in Idaho, are thought to be used to a limited extent by lynx for foraging and dispersal activities.

APHIS Rangeland Grasshopper and Mormon Cricket Program activities will have no effect on Canada Lynx because the pesticides used and the rates at which they are used for grasshopper suppression pose very little risk to the Canada Lynx and will not affect its prey base. Furthermore, Canada Lynx are unlikely to be found in the open rangeland areas where APHIS Rangeland Grasshopper Program activities occur (USFWS 2005).

Grizzly Bear, *Ursus arctos*
The grizzly bear has been federally listed as a Threatened species. Habitat for the bear in the project area is primarily in the Island Park area. The acreage is relatively small, but it could be important for a recovered population of bear. Any impact is highly unlikely as a result of proposed pesticides at the proposed rates of application. (USFWS 06/01/87)

Slickspot Peppergrass, *Lepidium papilliferum* – Proposed Threatened
On February 11, 2014 the U.S. Fish and Wildlife Service reaffirmed its proposal to list the species as threatened under the Endangered Species Act and revised its critical habitat designations.

Lepidium papilliferum is an herbaceous plant that was first collected in 1892 near Nampa, Idaho. This Idaho endemic is found in Ada, Canyon, Gem, Elmore, Payette, and Owyhee Counties. Lepidium papilliferum is a taprooted annual or biennial plant that reaches 4 to 12 inches, and displays two life cycle types. The annual life form matures, reproduces by setting seed, and dies in one growing season. The biennial life form starts growth the first year, but does not produce seed and die until the second year. Insect visitation appears essential for pollination, principally by bees and some beetle species.

This plant is associated with small slick spots interspersed within the sagebrush-steppe habitat. These slick spots are also called mini-playas or nitric sites and have high clay content. The majority of slick spots range in size from less than 10 square feet to 110 square feet within communities dominated by other plants.

Threats to the continued existence of this plant include wildfire, and changes to the frequency and intensity of wildfire due to the presence of nonnative annuals such as cheatgrass. Wildfire management and rehabilitation may also have an impact, as would grazing, off road vehicle use, and development. In order to protect pollinators of this plant, APHIS will maintain a three (3) mile no-treatment buffer from proposed critical habitat. Should treatment needs arise within that buffer, APHIS will consult with the USFWS to consider options (USFWS 2003).

Ute Ladies'-Tresses, *Spiranthes diluvialis* – Threatened
Ute Ladies'-Tresses is listed as threatened under the ESA. This perennial orchid occurs in mesic or wet meadows and riparian/wetland habitats formed by springs, seeps, lakes, and streams from 1,500 to 7,000 feet in elevation. It is presently known from Colorado, Montana, Nebraska, Utah, Washington, Wyoming, and Eastern Idaho along the South Fork of the Snake River between Swan Valley and the confluence with the Henry's Fork. The South Fork populations were first discovered in 1996. A total of 24 occurrences of Ute Ladies'-Ttresses are currently known from Idaho.

Surveys adjacent to the South Fork of the Snake River and other portions of the state have failed to discover additional Ute Lladies'-Ttresses populations outside of the South Fork of the Snake River. The USFWS has considered the entire state of Idaho to be within the potential range of this species. Large and long-tongued bumblebees

(*Bombus morrisoni* and *Bombus fervidus*) are the most important pollinators of Ute Ladies'-Tresses orchid. Along the South Fork Snake River and Henry's Fork River populations of Ute Ladies'-Tresses, APHIS would utilize a three (3) mile buffer for all aerial spray treatments (USFWS2003).

Northern Idaho Ground Squirrel, *Spermophilus brunneus brunneus* – Threatened

The Northern Idaho Ground Squirrel is smaller than most ground squirrels at about 8-9" long. Reddish-brown spots dot its coat, and the squirrel has a short, narrow tail, tan feet and ears, and a grey-brown throat. This rare squirrel needs large quantities of grass seed, stems, and other green leafy vegetation to store body energy for its eight-month hibernation from August through March. Adult males (two years old) emerge

from their burrows first in early spring, usually March or early April, followed by the females and then their young.

In 1985, scientists estimated that over 5,000 ground squirrels inhabited west-central Idaho. The animals occurred in open meadows and shrub/grasslands among coniferous forests of older Ponderosa pines and Douglas fir. The major threat to the Northern Idaho Ground Squirrel is habitat loss due to conifer invasion and fire suppression. Other potential threats include agricultural land conversion, urban development, recreational activities, and naturally occurring events such as severe droughts lasting longer than three (3) years.

If there are treatment needs within the area occupied by North Idaho Ground Squirrel, APHIS would consult with USFWS on a case-by-case basis to examine alternatives (USFWS, 2005).

Candidate Species

Columbia Spotted Frog, *Rana luteiventris* – Candidate

The Columbia Spotted Frog is olive green to brown in color, with irregular black spots. They may have white, yellow or salmon coloration on the underside of the belly and legs. Tadpoles are black when small, changing to a dark then light brown as they increase in size. Spotted frogs are about one inch in body length at metamorphosis, can attain a length of four inches as adults, and can live more than ten years. They begin reproducing in their second or third year. Softball-sized egg masses are deposited in shallow, calm water in March and April, depending on

weather and climate. Tadpoles hatch two to three weeks later, eventually moving from breeding sites to any connected wet areas and feeding on algae, plant material, and detritus. Tadpoles transform into small juvenile frogs between late July and November, at which time they forage on tiny insects before seeking shelter for winter hibernation.

Spotted frogs live in spring seeps, meadows, marshes, ponds, and streams, usually where there is abundant vegetation. They often migrate along riparian corridors between habitats used for spring breeding, summer foraging, and winter hibernation. Depending on climate and habitat conditions, spotted frogs may begin seeking overwinter sites as early as September. Springs, cutbanks, and willow roots provide quality habitat for hibernacula that are well-oxygenated and stable in temperature.

Prior to 1997, the Columbia Spotted Frog and the Oregon Spotted Frog were lumped into one species, *Rana pretiosa.* Additional genetic information indicated that they are two separate species. Columbia Spotted Frogs have been further divided into four populations, including the Great Basin population. The Great Basin population is found in Eastern Oregon, Southwestern Idaho, and Nevada. In Idaho, it occurs in the mid-elevations of the Owyhee uplands and in Southern Twin Falls County.

Threats to the Great Basin population of Columbia Spotted Frogs include grazing, spring development, road and trail construction, water diversion, fire in riparian corridors, pesticides, disease, and the introduction of non-native fish. Increasing habitat fragmentation due to activities that reduce riparian connectivity makes local populations vulnerable to extirpation.

APHIS would utilize a .5 mile buffer for aerial sprays, and a 500 foot buffer for Carbaryl bait from known occupied habitat. If there are treatment needs within the buffer area, APHIS would consult with USFWS on a case-by-case basis to examine alternatives (USFWS 2008).

Southern Idaho Ground Squirrel, *Spermophilus brunneus endemicus* - Candidate
The Southern Idaho Ground Squirrel is about 8-9" long, with a short, narrow tail, tan feet and ears, and a grey-brown throat. This small-eared mammal differs from a similar subspecies, the Northern Idaho Ground Squirrel, in pelage coloration. The Southerns have a noticeably paler coat than the Northerns, which is attributed to the

lower-elevation, sagebrush/grassland habitat in which they live. The granitic sands and clays of the Weiser River Basin are thought to influence the Southern Idaho Ground Squirrel's lighter coloration, while the deeper reddish-colored Northerns are found in higher-elevation areas with shallow reddish soils of basaltic origin. Research suggests that the squirrels prefer areas with a high percentage of native cover such as big sagebrush, bitterbrush and a variety of native forbs and grasses; however, some nonnative features may enhance their survival such as alfalfa fields, haystacks or fence lines.

These squirrels spend much of their time underground. Adults emerge from seasonal hibernation in late January or early February, depending on elevation and habitat conditions. As with other ground squirrels in the Northwest, the adults have a short active season above ground of 4 to 5 months. During this time, the animals feed on large quantities of grass seed, stems, and green leafy vegetation, which are required for storage of fat to survive long months of hibernation. When squirrels emerge from their burrows they begin breeding. Young are born about three weeks later and emerge from the nest burrow in about 50 days. The ground squirrels cease their above ground activity by late June or early July to return to their burrows for hibernation.

During the past 30 years, a dramatic population decline of Southern Idaho Ground Squirrels has occurred. Surveys indicate a precipitous decline in squirrel populations since the mid-1980s. In 1985, one study estimated the population at around 40,000. A 1999 Survey of 145 of the 180 known historical population sites indicated that only 53 sites (37 percent) were still occupied. Furthermore, 52 of the 53 sites had what biologists characterized as “remarkable low levels of activity”. The Southern Idaho Ground Squirrel occurs within an 810-square mile area (Gem, Payette, and Washington Counties).

Threats to Southern Idaho Ground Squirrels include exotic grasses and weeds; habitat fragmentation; direct killing from shooting, trapping or poisoning; predation; competition with Columbian Ground Squirrels (*Spermophilus columbianus*); and inadequacy of existing regulatory mechanisms to protect the species or its habitat. Most of these threats occur throughout the range of the species.

APHIS would consult with USFWS to address site-specific concerns (USFWS 2003).

Greater Sage Grouse *Centrocerus urophasianus* **–** Candidate

Young grouse hatch in the spring at about the same time as grasshopper populations begin to mature. Insects are a critical source of protein for the young birds. Large grasshopper populations may be common in the critical habitat.

APHIS will abide by the guidance contained in the December 22, 2011 BLM Memorandum regarding grasshopper and Mormon cricket treatments within sage grouse habitat. Specifically, the memorandum suggests managers to:

- Evaluate and/or restrict treatment methods or timing of use within seasonal or priority habitats.
- Avoid spraying treatment areas in May and June (or as appropriate to local circumstances) to ensure necessary insect availability for early development of sage grouse chicks.
- Apply greater restrictions in priority areas, if needed.
- Use alternative chemicals that have lower toxicity to sage-grouse.
- Evaluate the appropriate percentages of Environmental Protection Agency (EPA) allowable rates, and the pros and cons of available chemical use in coordination with state fish and wildlife agencies, U.S. Fish and Wildlife Service, and APHIS.
- Use ULV Malathion and Carbaryl only in emergency cases.
- Implement effectiveness monitoring if warranted.

Yellow-billed Cuckoo, *Coccyzus americanus* –Threatened

The Yellow-billed Cuckoo is a secretive, robin-sized songbird that lives in the Western United States in willow and cottonwood forests along rivers and streams. The birds are generally absent from heavily forested areas and large urban areas. Yellow-billed Cuckoos primarily eat large insects such as caterpillars and cicadas, as well as an occasional small frog or lizard. Cuckoos usually lay two or three eggs, and the young develop very rapidly. On average, it takes seventeen days from egg-laying to fledging of young. Yellow-billed cuckoos breed from southern Canada south to the Greater Antilles and Mexico. While the Yellow-billed Cuckoo is common east of the Continental Divide, biologists estimate that more than 90 percent of the bird's riparian habitat in the West has been lost or degraded as a result of conversion to agriculture, dams and river flow management, bank protection, overgrazing, pesticide use, and competition from exotic plants such as tamarisk.

Populations have declined rapidly throughout the western U.S. in the 20th Century and are extirpated from British Columbia, Washington, and possibly Nevada. In Idaho, the species is considered a rare visitor and breeder in the Snake River Valley, occurring in ten of the counties within the proposed suppression area.

APHIS would utilize a 500 foot buffer from the edge of the riparian zone in potential cottonwood/willow habitat and from the edge of Proposed Critical Habitat.

Goose Creek Milkvetch, *Astragalus anserinus* – Candidate
This plant species occurs in the upper Goose Creek drainage of Cassia County, Idaho, Box Elder County, Utah, and Elko County, Nevada. This plant was first collected in 1982 in Box Elder County, Utah and described in 1984. It is a low growing, matted, perennial forb in the pea or legume family (Fabaceae), with grey, hairy leaves, pink-purple flowers, and brownish-red curved seed pods. This plant typically flowers from late May to early June. Pollination is assumed to be accomplished via insects, but the specific pollinators are unknown.

APHIS would maintain a three (3) mile, no aerial insecticide treatments from known populations.

If there are treatment needs within the buffer area, APHIS would consult with USFWS on a case-by-case basis to examine alternatives.

Species under Review by U.S. Fish and Wildlife Service or Petitioned For Listing as T&E

Bonneville Cutthroat Trout and Yellowstone Cutthroat Trout
Both the Bonneville Cutthroat Trout and Yellowstone Cutthroat Trout are currently petitioned for listing as threatened under the ESA. The Bonneville Cutthroat Trout is limited to the Bear River watershed. The Yellowstone Cutthroat Trout is believed to occupy a number of streams scattered across Eastern Idaho. Their current distribution is under investigation.

Mulford's Milkvetch, Woven-Spore Lichen, and Malheur Prince's Plume
These plants are currently under review by the USFWS for listing as federal candidate species. Mulford's Milkvetch, *Astragalus mulfordiae*, is endemic to Southwest Idaho and extreme Southeast Oregon, where it grows in deep sandy soils. It is typically associated with bitterbrush, needle-and-thread grass, and Indian ricegrass. In Idaho, Mulford's Milkvetch is known from Ada, Owyhee, Payette, and Washington Counties.

While no information is available regarding its pollination biology, Mulford's Milkvetch is believed to be insect pollinated. Seed dispersal is most likely by gravity and wind. Although no data are readily available, it may be consumed by grasshoppers.

Woven-Spore Lichen, *Texosporium sancti-jacobi*, grows on humus in sagebrush-steppe habitats in Southwest Idaho, Central Oregon, and Southern Washington. Several localities are also known from Southern California. Woven-Spore Lichen has been found at fourteen (14) localities in Idaho, all within Ada and Elmore Counties. Most of the sites are adjacent to or are surrounded by private land. Nothing is known of its reproductive or dispersal mechanisms. Although no data are readily available, it may be consumed by grasshoppers.

The USFWS initiated a status review for Malheur Prince's Plume, *Stanleya confertiflora*, in 2000. This showy, three foot tall biennial plant species is known from six widely scattered localities in Gooding, Owyhee, and Washington Counties in southwest Idaho. It grows only on sparsely vegetated clay soils. Approximately fifteen (15) populations of Malheur Prince's Plume are known from southeast Oregon in Harney and Malheur Counties. A variety of bees and beetles have been observed visiting the flowers, but no pollination studies have been conducted. Although no data are readily available, it may be consumed by grasshoppers.

6. Environmental Monitoring

Monitoring involves the evaluation of various aspects of the Rangeland Grasshopper and Mormon Cricket Suppression Programs. There are three (3) aspects of the programs that may be monitored. The first is the efficacy of the treatment. APHIS will determine how effective the application of an insecticide has been in suppressing the grasshopper/Mormon cricket population within a treatment area. Pesticides used are sampled, and laboratory analyzed to verify active ingredient concentrations.

The second aspect included in monitoring is safety. This includes ensuring the safety of the program personnel through medical monitoring of employee cholinesterase levels.

The third aspect of monitoring is environmental monitoring. APHIS Directive 5640.1 commits APHIS to a policy of monitoring the effects of Federal programs on the environment. Environmental monitoring includes such activities as checking to make sure the insecticides are applied in accordance with the labels, and that sensitive sites and organisms are protected.

The environmental monitoring recommended for grasshopper and Mormon cricket suppression programs involves monitoring sensitive sites such as bodies of water, endangered or threatened species habitat, other sensitive wildlife species habitat, and any sites for which the public has expressed concern or where humans might congregate (e.g., schools, parks, hospitals). APHIS does conduct post-treatment assessments to determine if any non-target impacts may be attributed to the treatments. Observers monitor wildlife, including migratory birds, to determine if any mortality or unusual behaviors are exhibited.

Table Key

Special Species Status

C	Candidate Species for possible listing under the Endangered Species Act
E	Listed Endangered under the Endangered Species Act
P	Proposed for listing under the Endangered Species Act
T	Listed Threatened under the Endangered Species Act
X	Experimental, Non-essential Population

Determinations

NE	No Effect
NJ	Not Likely to Jeopardize the Population
NLAA	Not Likely to Adversely Affect

Table 1 – Proposed Protection Measures/Determinations

Threatened and Endangered Species Idaho Grasshopper/Mormon Cricket Suppression Program	
Bull Trout (T) NLAA	In all areas proposed as critical habitat for Bull trout, APHIS would utilize a .5 mile buffer for all aerial sprays and a 500 foot buffer for Carbaryl bait. If there are treatment needs within the buffer area, APHIS would consult with USFWS on a case-by-case basis to examine alternatives. (USFWS 2003)
Ute Ladies' Tresses (T) NLAA	Along the South Fork snake River and Henry's Fork River populations of Ute Ladies'-Tresses, APHIS would utilize a 3-mile buffer for all aerial spray treatments. (USFWS 2003)
Bliss Rapids Snail (T) Utah Valvata Snail (E) Snake River Physa Snail (E) Banbury Springs Lanx (E) NLAA	Along the Snake River and associated springs, APHIS would utilize a .5 mile buffer for all aerial sprays and a 500 foot buffer for Carbaryl bait. If there are treatment needs within the buffer area, APHIS would consult with USFWS on a case-by-case basis to examine alternatives. (USFWS 2003)
Bruneau Hot Springsnail (E) NLAA	Within the recovery area as defined in the final BHSS Recovery Plan, APHIS would utilize a .5 mile buffer for all aerial sprays and a 500 foot buffer for Carbaryl bait. If there are treatment needs within the buffer area, APHIS would consult with USFWS on a case-by-case basis to examine alternatives. (USFWS 2003)
Grizzly Bear (T) (NE)	Any impact highly unlikely as a result of proposed pesticides at proposed rates of application. (USFWS 06/01/87)
Canada Lynx (T) (NE)	APHIS Grasshopper and Mormon Cricket Program activities will have no effect on Canada Lynx because the pesticides used and the rates at which they are used for Mormon cricket suppression pose very little risk to the Canada Lynx and will not affect its prey base. Furthermore, Canada Lynx are unlikely to be found in the open rangeland areas where APHIS Mormon Cricket Program activities occur. (USFWS 2005)
Northern Idaho Ground Squirrel (T) NLAA	APHIS will avoid the sensitive area for NIGS as defined by the red line on the Service's distribution map (provided to APHIS during a meeting in March 2003). For treatment requests within this area, APHIS will contact the Service to address site-specific concerns. (USFWS 2005)
Slickspot Peppergrass (P) Proposed Critical Habitat (PCH)	APHIS will maintain a 3 mile buffer to protect pollinators. If there are treatment needs within this buffer, APHIS will consult with the Service to consider options.

Table 2 – Proposed Protection Measures/Determinations

Threatened and Endangered Species Idaho Grasshopper/Mormon Cricket Suppression Program	
Yellow-Billed Cuckoo (T) Yellow Billed Cuckoo Proposed Critical Habitat (PCH)	A 500 foot buffer from the edge of the riparian zone in potential cottonwood/willow habitat will be maintained. Areas identified as Proposed Critical Habitat will also be buffered 500 feet.
Columbia Spotted Frog (C)	To protect the Columbia Spotted Frog, APHIS will utilize a .5 mile buffer for aerial sprays, and a 500 foot buffer for Carbaryl bait from known occupied habitat.
Greater Sage Grouse (C)	APHIS will abide by the protective measures in the December 27, 2011 BLM Instruction Memorandum No. 2012-043. These protections are described on page 68 in the sage grouse discussion.
Southern Idaho Ground Squirrel (C)	APHIS would consult with USFWS before treating occupied Southern Idaho Ground Squirrel habitat.
Goose Creek Milkvetch (C)	APHIS would maintain a 3 mile no aerial spray buffer from known populations of Goose Creek Milkvetch. If there are treatment needs within the buffer area, APHIS would consult with USFWS on a case-by-case basis to examine alternatives.

Table 3 – Proposed Protection Measures/Determinations

State Sensitive Species Idaho Grasshopper/Mormon Cricket Suppression Program	
Bonneville and Yellowstone Cutthroat Trout Redband Trout Leatherside Chub (S) Mulford's, Mourning, Picabo, Snake River, Lost River, Drummonds, Two-Groove, Meadow, Lemhi, and Plains Milkvetches (S) Packards Milkvetch Woven-Spore Lichen Malheur Princes Plume Janish's Penstemon Matted Cowpie Buckwheat Winged-Seed and St. Anthony Evening Primroses Sepal-Tooth Dodder Giant Hellborine False Mountain Willow Scapose Silene (S) Western Burrowing Owl Northern Harrier Swainson's Hawk Upland Game Birds including Sage and Sharp Tail Grouse. (S) Kit Fox (S) Western and Woodhouse's Toads Northern Leopard Frog (S) Western Ground Snake Longnose Snake Common Garter Snake (S) Townsend's Big Eared Bat Spotted Bat Western Small-footed Myotis Long Eared and Yuma Myotis Fringed and Long-legged Myotis Western Pipistrelle Bat (S)	Insecticide application rates would be reduced below EPA maximum allowable rates. Carbaryl bait would be applied at no more than 50% of the labeled maximum rate, and Diflubenzuron would be applied at 37.5% of the labeled maximum rate. Additionally, treatment blocks would not receive full area coverage. 25% to >99% of grassland treatment blocks and 50%to 99% of sagebrush steppe treatment blocks would not receive direct application under preferred alternative. Under the preferred alternative, insecticide application rates would be reduced below EPA maximum allowable rates. Percentage of EPA maximum allowable rates which would be applied: Carbaryl bait 25% Diflubenzuron spray 37.5% Malathion spray 50% Additionally, treatment blocks would not receive full area coverage. 25% to >99% of treatment block would not receive direct application. Aerial applications of Carbaryl bait or Diflubenzuron or Malathion spray would not be made within 500 feet of water. Ground applications of Carbaryl bait would not be made within 50 feet of water. APHIS will abide by the guidance contained in the December 22, 2011 BLM Memorandum regarding grasshopper and Mormon cricket treatments within sage grouse habitat. Aphis would maintain a 3 mile no aerial spray buffer from known populations of Packards Milkvetch. If there treatment needs within the buffer area, APHIS would consult with USFWS on a case-by-case basis to examine alternatives.

Idaho Dunes Tiger Beetle Bruneau Dunes Tiger Beetle	To protect the Idaho Dunes Tiger Beetle, APHIS will provide a .5 mile aerial buffer and 300 feet ground bait buffer as stipulated in the 1996 Conservation Strategy for the Idaho Dunes Tiger Beetle. These measures will also be applied to protect the Bruneau Dunes Tiger Beetle.
Raptor Shrimp (Branchineta raptor) (S)	To protect Raptor Shrimp, APHIS would not treat within one mile of occupied Playa habitat.
Point headed Grasshopper	To protect the Point headed Grasshopper (Acrolophitus pulchellus), APHIS will consult with the BLM and FS to identify occupied habitat and will avoid pesticide applications in those areas.

VI. Works Cited

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VII. Listing of Agencies and Persons Consulted

Safford, Dan, Idaho State Department of Agriculture, 2270 Old Penitentiary Rd., P.O. Box 790, Boise, ID 83709

Hopper, Dave, Snake River Basin Office, U.S. Fish and Wildlife Service, US Dept. of The Interior, 1387 S. Vinnell Way, Suite 368, Boise, ID 83709

Jirik, Steve, ES&R and Weed Coordinator, State Office, Bureau of Land Management, Dept. of Interior, 1387 S. Vinnell Way, Boise, ID 83709

VIII. Listing of Acronyms and Abbreviations

a.i.	Active Ingredient
ACEC	Area of Critical Environmental Concern
AChE	Acetylcholinesterase
APHIS	Animal and Plant Health Inspection Service
ATV	All-Terrain Vehicle
BHSS	Bruneau Hot Springsnail
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
DRNA	Designated Research Natural Areas
E.O.	Executive Order
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
et al.	and others
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact
FR	Federal Register
FS	(U.S.) Forest Service
g/L	Grams per Litre
GHIPM	Grasshopper Integrated Pest Management
IPM	Integrated Pest Management
ISDA	Idaho State Department of Agriculture
LD_{50}	Median Lethal Dose
Mg/kg	Milligrams per kilogram
MOU	Memorandum of Understanding
MRAAT	Modified Reduced Agent Area Treatment
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
ONA	Outstanding Natural Area
ppm	Parts per million
PPQ	Plant Protection and Quarantine
RAAT	Reduced Agent Area Treatment
T&E	Threatened and Endangered
ULV	Ultra-low-volume
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
WSA	Wilderness Study Area

Appendix 1

APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program
FY-2015 Treatment Guidelines

The objectives of the APHIS Rangeland Grasshopper and Mormon Cricket Suppression Program are to: 1) conduct surveys in 17 Western States; 2) provide technical assistance to land managers; and 3) when funds permit, suppress economically damaging grasshopper and Mormon cricket outbreaks on federal, tribal, state, and/or private rangeland. The Plant Protection Act of 2000 provides APHIS the authority to take these actions.

General Guidelines for Grasshopper / Mormon Cricket Treatments

1. All treatments must be in accordance with:
    a. the Plant Protection Act of 2000;
    b. applicable environmental laws and policies such as: the National Environmental Policy Act, the Endangered Species Act, the Federal Insecticide, Fungicide, and Rodenticide Act, and the Clean Water Act (including National Pollutant Discharge Elimination System requirements – if applicable);
    c. applicable state laws;
    d. APHIS Directives pertaining to the proposed action; and
    e. Memoranda of Understanding with other Federal agencies.

2. Subject to the availability of funds, on request of the administering agency or the agriculture department of an affected State, APHIS, to protect rangeland, shall immediately treat Federal, State, or private lands that are infested with grasshoppers or Mormon crickets at levels of economic infestation, unless APHIS determines that delaying treatment will not cause greater economic damage to adjacent owners of rangeland. In carrying out this section, APHIS shall work in conjunction with other Federal, State, Tribal, and private prevention, control, or suppression efforts to protect rangeland.

3. Prior to the treatment season, conduct meetings or provide guidance that allows for public participation in the decision making process. In addition notify Federal, State and Tribal land managers and private landowners of the potential for grasshopper and Mormon cricket outbreaks on their lands. Request that the land manager/land owner advise APHIS of any sensitive sites that may exist in the proposed treatment areas.

4. Consultation with local Tribal representatives will take place prior to treatment programs to fully inform the Tribes of possible actions APHIS may take on tribal lands.

5. On APHIS run suppression programs, the Federal government will bear the cost of treatment up to 100 percent on Federal, Tribal, and Trust land; 50 percent of the cost on State land; and 33 percent of cost on private land. There is an additional 16.15% charged to any funds received by APHIS for federal involvement with suppression treatments.

6. Land managers are responsible for the overall management of rangeland under their control to prevent or reduce the severity of grasshopper and Mormon cricket outbreaks. Land

managers are encouraged to have implemented Integrated Pest Management Systems prior to requesting a treatment. In the absence of available funding or in the place of APHIS funding, the federal land management agency, tribal authority or other party/ies may opt to reimburse APHIS for suppression treatments. Interagency agreements or reimbursement agreements must be completed prior to the start of treatments which will be charged thereto.

7. There are situations where APHIS may be requested to treat rangeland that also includes areas where crops are being grown (typically less than 10 percent of the treatment area). In those situations, the crop owner pays the entire treatment costs on the croplands. Note: the insecticide being considered must be labeled for that crop as well as rangeland.

8. In some cases, rangeland treatments may be conducted by other federal agencies (e.g., Forest Service, Bureau of Land Management, or Bureau of Indian Affairs) or by non-federal entities (e.g., Grazing Association or County Pest District). APHIS may choose to assist these groups in a variety of ways, such as:
    a. loaning equipment; (an agreement may be required);
    b. contributing in-kind services such as surveys to determine insect species, instars, and infestation levels;
    c. monitoring for effectiveness of the treatment; and
    d. giving technical advice.

9. In areas considered for treatment, State-registered beekeepers and organic producers shall be notified in advance of proposed treatments. If necessary, non-treated buffer zones can be established.

Operational Procedures

1. Follow all applicable Federal, State, Tribal and local laws and regulations in conducting grasshopper and Mormon cricket suppression treatments.

2. Notify residents within treatment areas, or their designated representatives, prior to proposed operations. Advise them of control method to be used, proposed method of application, and precautions to be taken.

3. One of the following insecticides that are labeled for rangeland use can be used for a suppression treatment of grasshoppers and Mormon crickets:
    a. Carbaryl, either as solid bait or ultra low volume spray
    b. Diflubenzuron ultra low volume spay
    c. Malathion ultra low volume spray.

4. Do not apply insecticides directly to water bodies (defined herein as reservoirs, lakes, ponds, pools left by seasonal streams, springs, wetlands, and perennial streams and rivers).

    Furthermore, provide the following buffers for water bodies:
    - 500-foot buffer with aerial liquid insecticide
    - 200 foot buffer with ground liquid insecticide
    - 200-foot buffer with aerial bait

- 50-foot buffer with ground bait.

5. Instruct program personnel in the safe use of equipment, materials, and procedures; supervise to ensure procedures are properly followed.

6. Conduct mixing, loading, and unloading in an approved area where an accidental spill would not contaminate a water body.

7. Each suppression program will have a Treatment Manager on site. Each State will have at least one Contracting Officer's Representative available to assist in GH/MC suppression programs.

8. Each suppression program will conduct environmental monitoring as outlined in the 2015 Environmental Monitoring Plan.

9. APHIS will assess and monitor rangeland treatments for the efficacy of the treatment, to verify that a suppression treatment program has properly been implemented and assure that any environmentally sensitive sites were protected.

10. APHIS reporting requirements associated with grasshopper/Mormon cricket suppression treatments can be found in the APHIS Grasshopper Program Guidebook: http://www.aphis.usda.gov/import_export/plants/manuals/domestic/downloads/grasshopper.pdf

SPECIFIC PROCEDURES FOR AERIAL APPLICATIONS

1. APHIS Aerial treatment contracts will adhere to the 2015 Statement of Work.

2. Minimize the potential for drift and volatization by not using ULV sprays when the following conditions exist in the spray area:

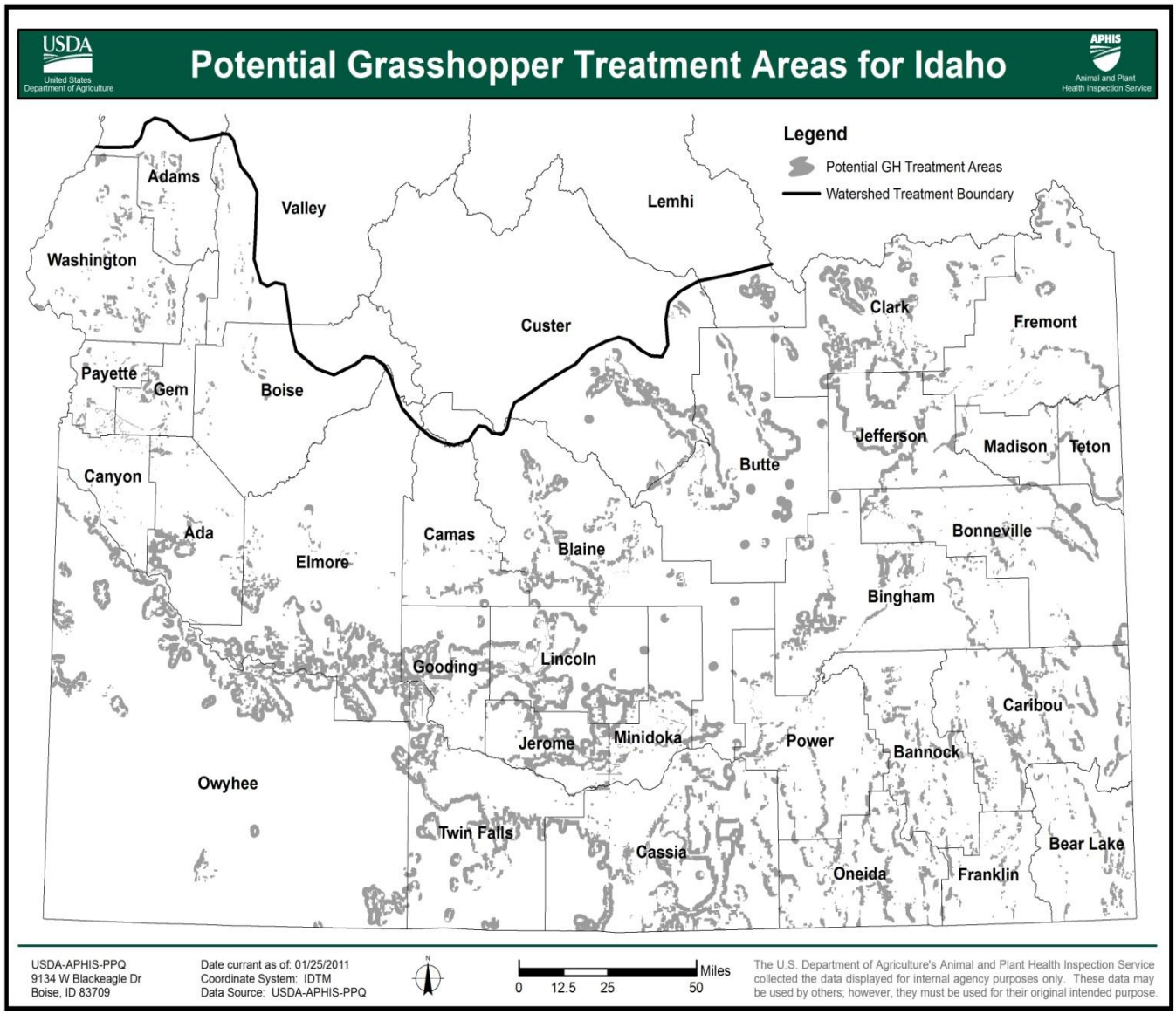
    a. Wind velocity exceeds 10 miles per hour (unless state law requires lower wind speed);
    b. Rain is falling or is imminent;
    c. Dew is present over large areas within the treatment block;
    d. There is air turbulence that could affect the spray deposition; and
    e. Temperature inversions (ground temperature higher than air temperature) develop.

3. Weather conditions will be monitored during application, and treatment will be suspended when conditions could jeopardize the correct spray placement or pilot safety.

4. Application aircraft will fly at a median altitude of 1 to 1.5 times the aircraft's wingspan.

5. Whenever possible, plan aerial ferrying and turnaround routes to avoid flights over congested areas, water bodies, and other sensitive areas that are not to be treated.

Appendix 2


USDA
United States Department of Agriculture
Potential Grasshopper Treatment Areas for Idaho
APHIS
Animal and Plant Health Inspection Service
Legend
Potential GH Treatment Areas
Watershed Treatment Boundary
Adams
Valley
Lemhi
Washington
Custer
Clark
Fremont
Payette
Gem
Boise
Jefferson
Madison
Teton
Butte
Canyon
Ada
Camas
Blaine
Elmore
Bonneville
Bingham
Gooding
Lincoln
Caribou
Jerome
Minidoka
Power
Bannock
Owyhee
Twin Falls
Cassia
Bear Lake
Oneida
Franklin
USDA-APHIS-PPQ
9134 W Blackeagle Dr
Boise, ID 83709
Date currant as of: 01/25/2011
Coordinate System: IDTM
Data Source: USDA-APHIS-PPQ
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Miles
The U.S. Department of Agriculture's Animal and Plant Health Inspection Service collected the data displayed for internal agency purposes only. These data may be used by others; however, they must be used for their original intended purpose.

Appendix 3

Protocol for Documenting Requests, Evaluations, Recommendations, Reviews, Treatments and Monitoring of Federal Rangeland Grasshopper and Mormon Cricket Suppression Program in Idaho

1. Private landowners and/or public land managers who wish to request evaluations for grasshopper suppression should complete Form 1 (*Request for Evaluation of Need for Suppression of Grasshoppers or Mormon Crickets in Idaho*) and fax to USDA in Boise or Twin Falls. Private landowners may also call federal land management or state offices to request the submission of this form. A case number will be assigned by USDA to each request. Requests which involve state or private land will be referred to Idaho State Department of Agriculture.

2. The USDA APHIS PPQ Grasshopper Program Staff will supervise temporary personnel across Southern Idaho. Grasshopper scouts will conduct evaluations in response to requests, as well as in areas that are historically susceptible to grasshopper infestations. The grasshopper scouts will complete Form 2 (*Survey Evaluation of Idaho Request #___ for Suppression of Grasshoppers or Mormon Crickets).* Scouts will submit these reports to USDA in Boise or Twin Falls.

3. Experienced USDA managers will review the scouts' evaluations and determine if follow-up analysis is required. The USDA Grasshopper Coordinator will complete Form 3 (*USDA APHIS PPQ Recommendation per Idaho Request #___ for Suppression of Grasshoppers or Mormon Crickets).* USDA will forward this form, as well as Forms 1 and 2 to the appropriate federal land manager.

4. Land managers will receive the above-mentioned forms and will determine whether APHIS's recommendation is consistent with the program defined and analyzed in the environmental documentation. The land manager will determine if additional safeguards are required for treatments. Land managers will complete Form 4 (*Federal Land Manager Consistency Review of Idaho Request #___ for Suppression of Grasshoppers or Mormon Crickets).* They will forward these forms to USDA.

5. If treatments are consistent with the description and analysis in the environmental documentation and if additional safeguards do not appear to preclude the treatment from being effective, USDA will apply or contract for application of the treatment. USDA will supervise contractors and evaluate the efficacy of treatments. USDA will keep daily treatment records and will complete Form 5 (*Summary of Treatment(s) on Request #___ for Suppression of Grasshoppers or Mormon Crickets).* USDA will provide this form to the appropriate federal land manager.

6. Following treatments, USDA will conduct post-treatment monitoring for program effectiveness and unintended outcomes. USDA will complete Form 6 (*Post-Treatment* M*onitoring of Treatments on Request #___ for Suppression of Grasshoppers or Mormon Crickets).* USDA will provide this document to US Fish and Wildlife Service and to the appropriate federal land manager.

REQUEST FOR EVALUATION OF NEED FOR SUPPRESSION OF GRASSHOPPERS OR MORMON CRICKETS IN IDAHO.

*Land managers/owners complete this form and **fax** to **Boise 208-378-5794** or **Twin Falls 208-734-7863.** Or, **mail** to **USDA APHIS PPQ, 9134 W. Blackeagle Drive, Boise ID 83709.** USDA APHIS PPQ and/or Idaho State Department of Agriculture will evaluate the problem and provide recommendations or solutions.*

Party requesting control: Date of request:

Principal contact (if other than party requesting control):

Address:

Phone/cell phone/fax numbers:

County(ies) where rangeland or crop is located:

Owner(s) or land manager(s) of rangeland
or crop where control is requested : BLM Forest Service State of Idaho Private party

Estimated acreage infested

Legal description (Township, Range, Sections) of area where control is requested (please attach map showing land ownerships):

Describe nature of problem (cropland threatened, rangeland damaged, revegetation project, etc.):

Are you aware of environmentally sensitive issues such as streams or lakes, bees, or endangered species critical habitat in the area where you are requesting treatment? If so, please explain.

****

FOR USE BY PPQ/ISDA
Date and time received: By:
Case #:
Referred to: By: At date/time:

1

EVALUATION OF IDAHO REQUEST # FOR SUPPRESSION OF GRASSHOPPERS OR MORMON CRICKETS IN IDAHO

Will be completed by Grasshopper Field Scout and will be submitted to USDA APHIS PPQ or ISDA Manager.

Date evaluated:

Person performing evaluation:

Was complainant contacted during visit? Yes No
Species of grasshopper or Mormon cricket:

Density per sq. yd.: Predominant instar(s):

Description of behavior:

Approximate acres of rangeland infested
Federal:
State:
Private:

Is water present within area or bordering area?

Narrative report including other sensitive issues (bees, endangered species, organic farms, etc.):

Attach map showing infested areas and sensitive sites

****

FOR USE BY PPQ/ISDA
Date and time received:
Referred to: By: At date/time:

****

USDA APHIS PPQ RECOMMENDATION PER IDAHO REQUEST #
FOR SUPPRESSION OF GRASSHOPPERS or MORMON CRICKETS

To be completed by USDA APHIS PPQ Grasshopper Coordinator upon receipt of evaluation from Field Scout. Will be forwarded to Federal Land Manager specified in request for evaluation (and person who initiated request if other than land manager).

I have reviewed the evaluation of complaint #_____ regarding an infestation on _____ in _____ County, Idaho.
I recommend the following course of action:

_____
Name and title of responsible USDA APHIS PPQ or ISDA Grasshopper Coordinator

Signature_____

Date_____

****
FOR USE BY PPQ/ISDA
Date and time received: By:
Referred to: By: At date/time:
****

FEDERAL LAND MANAGER CONSISTENCY REVIEW OF REQUEST # FOR SUPPRESSION OF GRASSHOPPERS or MORMON CRICKETS

To be completed by federal land manager after review of recommendations from USDA APHIS PPQ. Fax to 208-378-5794.

The Environmental Assessment, **"Site-Specific Environmental Assessment, Rangeland _____", and associated Finding of No Significant Impact (FONSI)** have been carefully reviewed. Request for Evaluation for Control, Evaluation of Request and Recommendation for Action #_____have also been carefully reviewed. The recommendation is:

Consistent ☐

Not Consistent ☐

with control actions on rangeland specified by those documents. Any treatment will be implemented by APHIS in accordance with the operational procedures, design features, and mitigating measures described and adopted in the above-referenced documents.

In addition, the following measures are required as well as those referenced above:

Due to the following extenuating circumstances, treatment should not occur:

Signature_____

Name, title and organization of responsible official_____

Date_____

Additional forms required by land management agency should be attached.

****

FOR USE BY LAND MANAGER
Date and time:
Referred to: By:

****

PPQLMconsistency030104 Form 4 A-4-5

TREATMENT(S) ON REQUEST # FOR SUPPRESSION OF GRASSHOPPERS or MORMON CRICKETS

To be completed by USDA APHIS PPQ at the time of treatment

Date(s) treatment occurred:

Contractor or employee(s) who applied treatment:

Acres treated:

Type and amount of pesticide applied:
Carbaryl 5% bait _____ total lbs.
Carbaryl 2% bait _____ total lbs.
Dimilin 2L _____ total oz.
Malathion _____ total oz.

Comments:

_____
Name of USDA APHIS PPQ/ISDA official managing control activity.

****
FOR USE BY PPQ
Date and time:
Referred to: By:
****

POST-TREATMENT MONITORING OF TREATMENT(S) ON REQUEST # FOR SUPPRESSION OF GRASSHOPPERS or MORMON CRICKETS

To be completed by USDA APHIS PPQ at the time of monitoring.

LOCATION OF POST-TREATMENT EVALUATION:

Date(s) of treatments:

Date of evaluation:

Target pest density per sq. yd.:

Predominant species:

Predominant instar(s):

Other monitoring observations:

Name of person conducting post-treatment monitoring

****

FOR USE BY PPQ
Date and time:
Referred to: By:

****